ELECTRICAL TIMES

THURSDAY
22 MAY
1952
NINEPENCE

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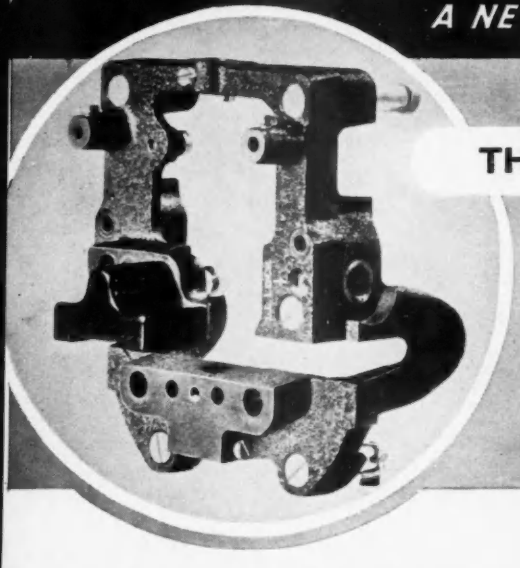

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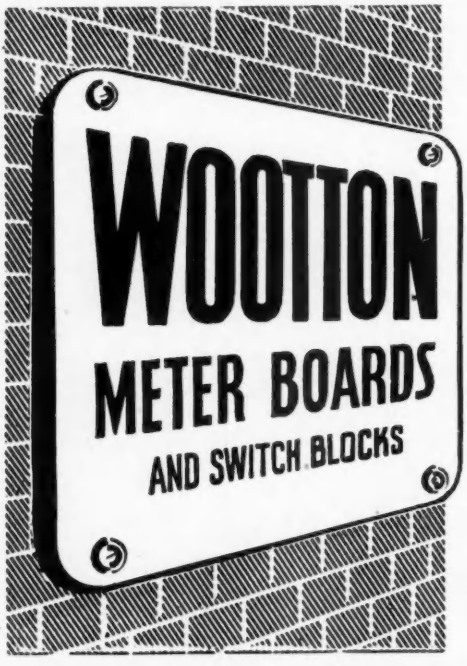

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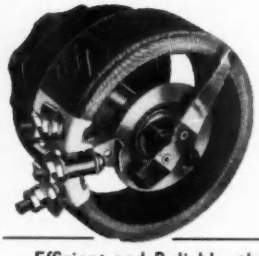

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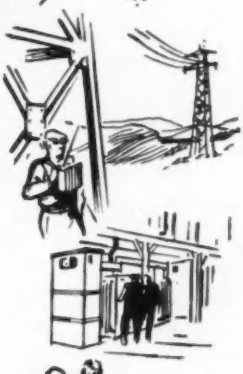

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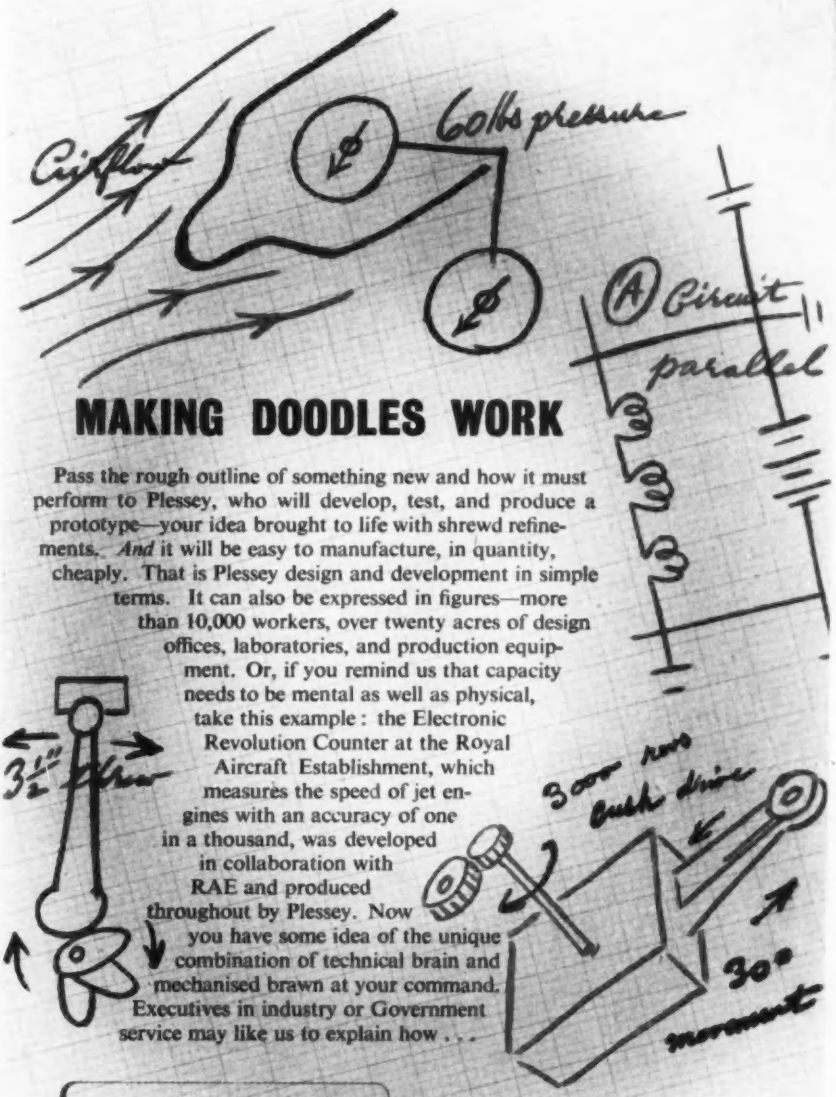

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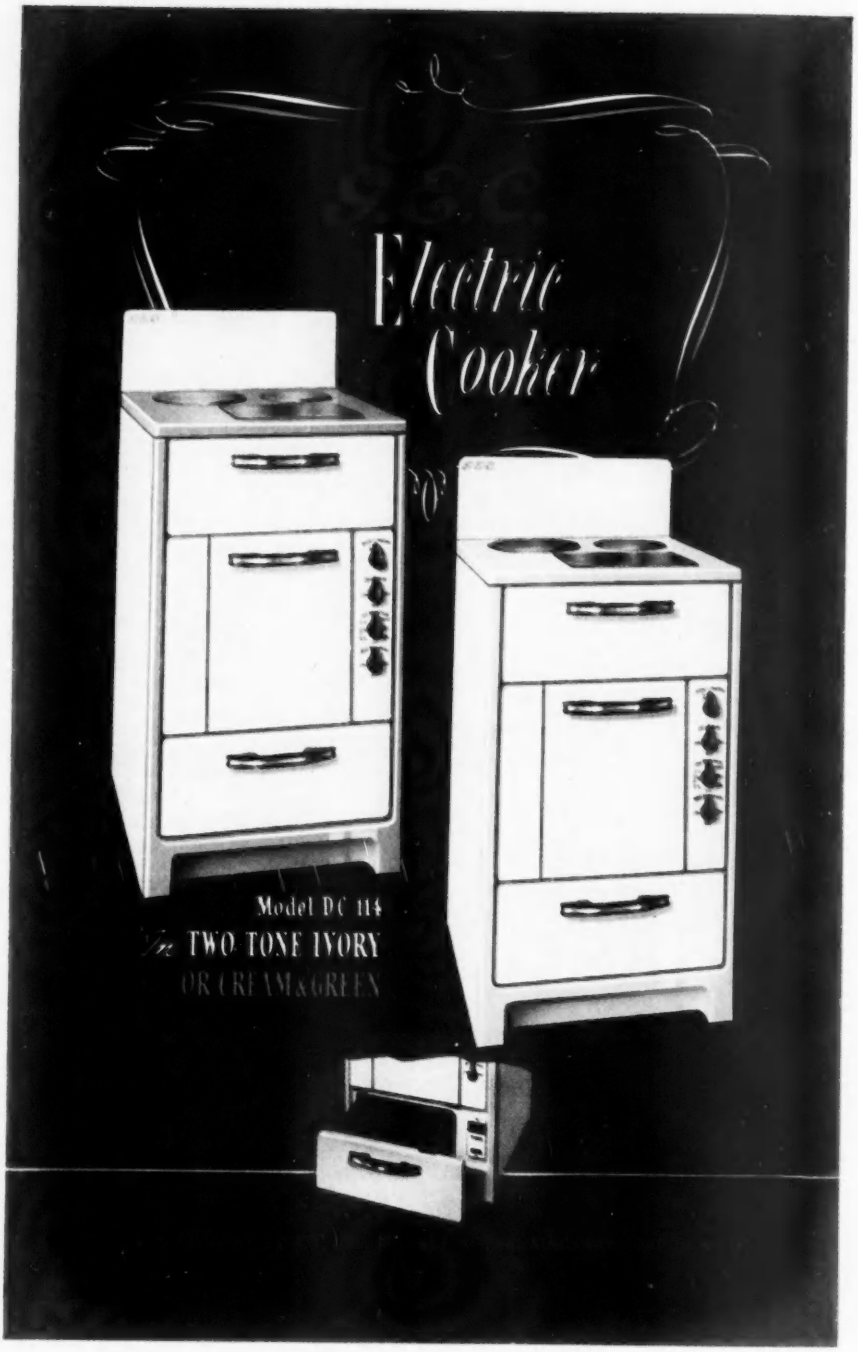
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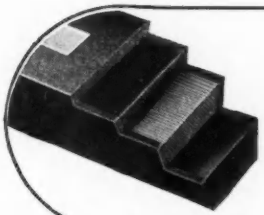

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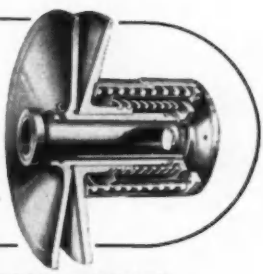

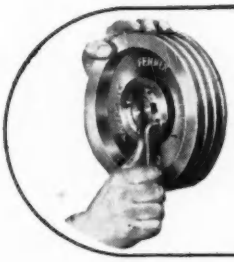

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B

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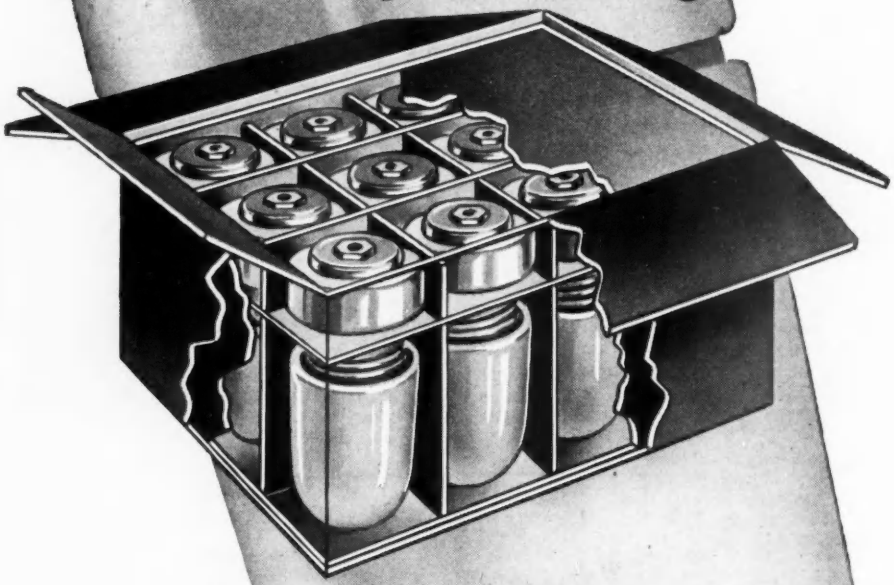

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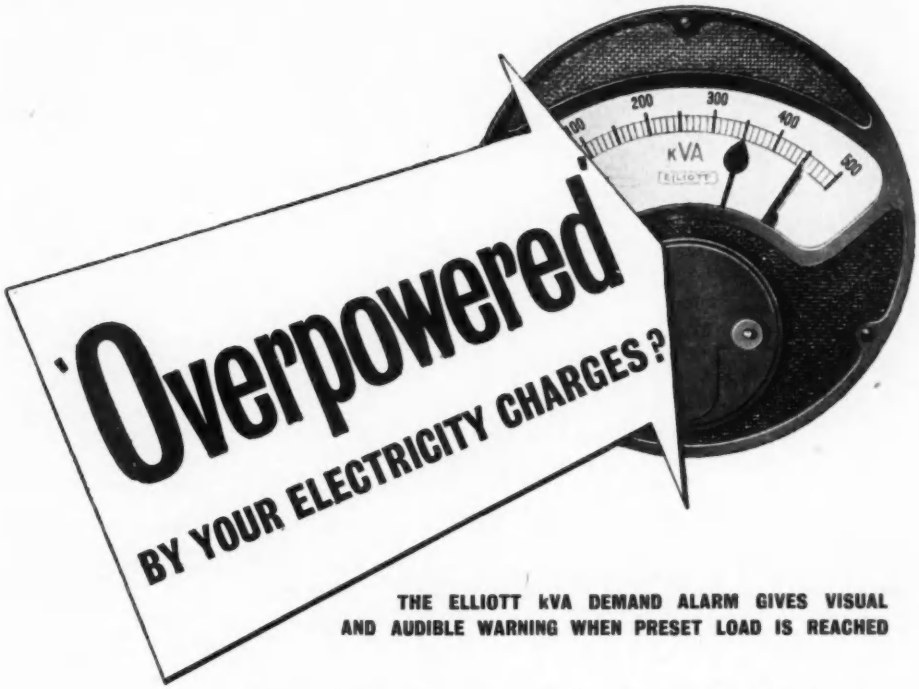

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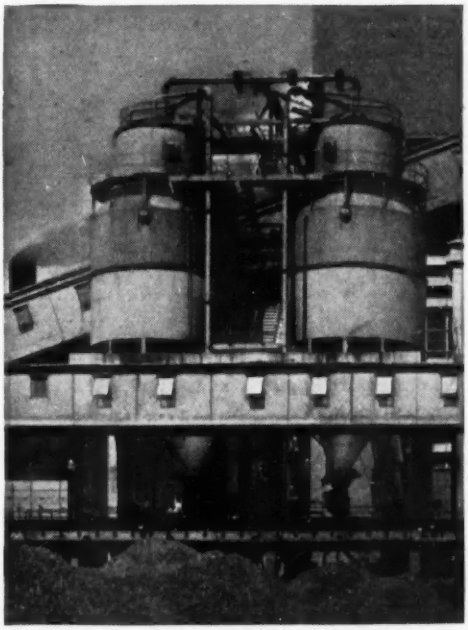

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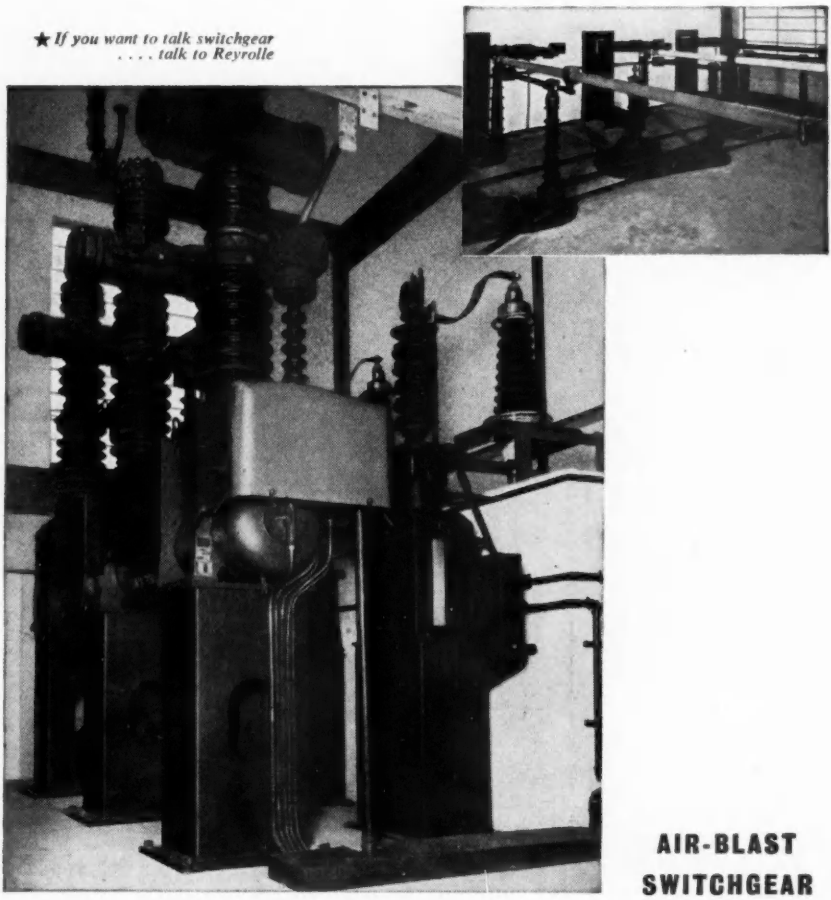

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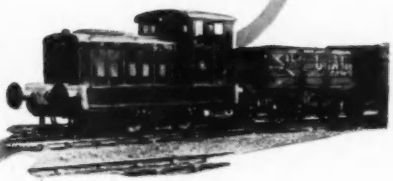

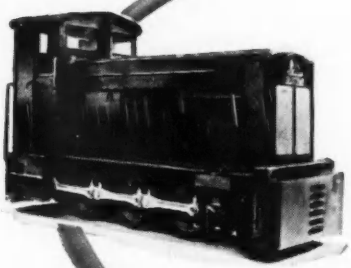

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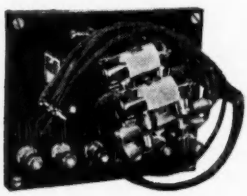

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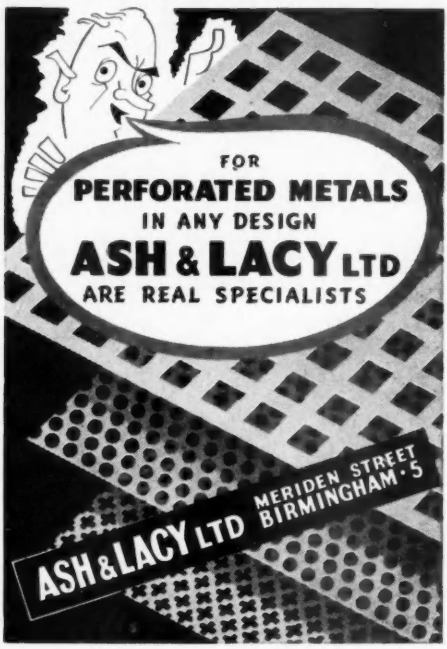

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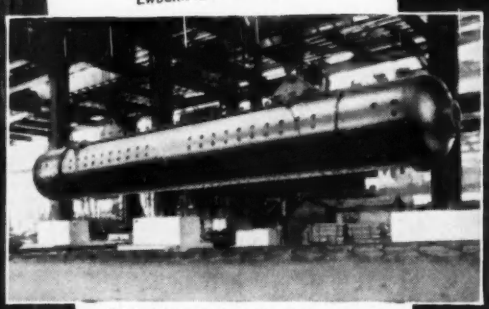

(Main illustration). Boiler during erection showing the walls of the superheater chamber (Inset illustration). Lifting the 65 ton fusion-welded steam drum for one of the Stirling boilers at Keadby.

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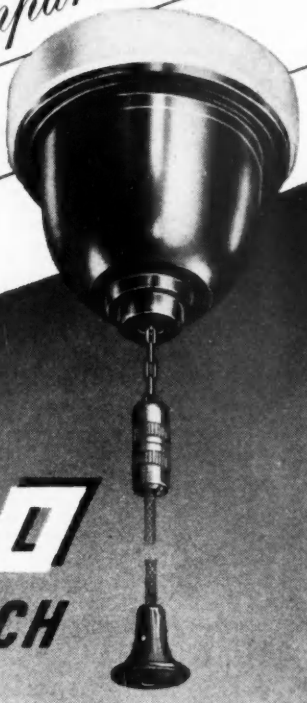

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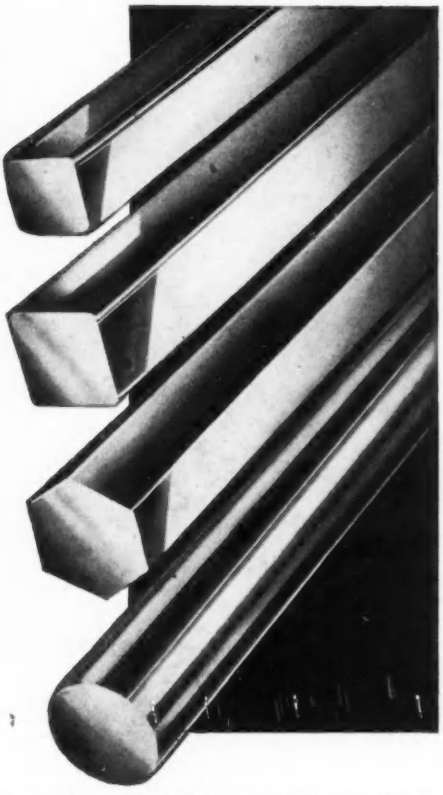

Manufactured from Wire Bars of guaranteed highest purity which are fabricated entirely in our own factories. The final product is of perfect quality, bright and free from discoloration.

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Incorporated in The London Electric Wire Company and Smiths, Limited. Associated with The Liverpool Electric Cable Co. Ltd. and Vactite Wire Co. Ltd.

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by the METROVICK TYPE NF Watt-hour Meter

SOME NOTABLE FEATURES

- Straight-line accuracy over a wide range of load.
- Complete temperature compensation.
- High accuracy over wide range of voltage.
- Damping system giving complete stability.
- Simple and accessible adjustments for calibration.
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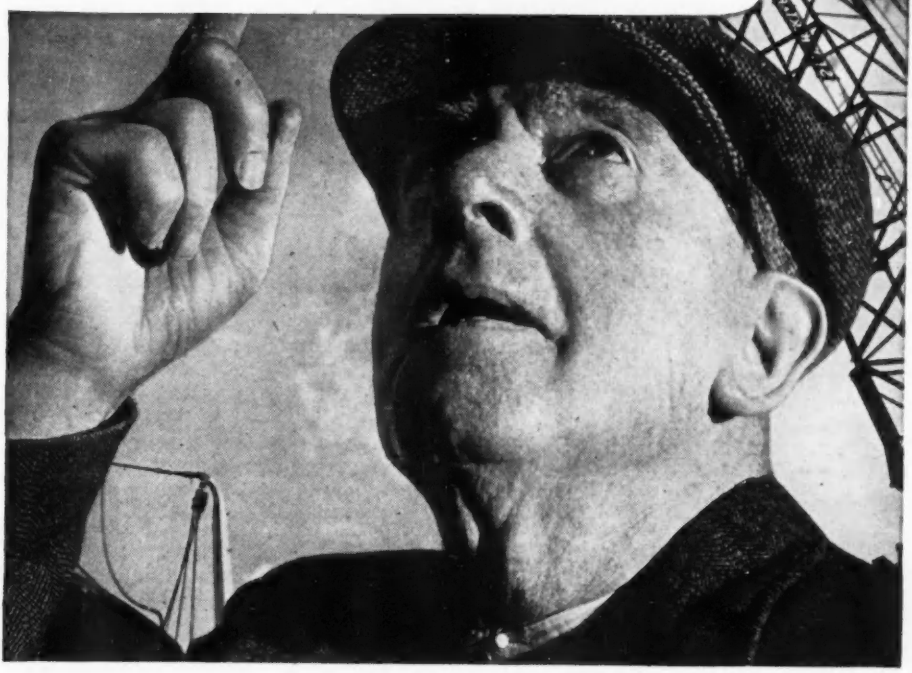
Member of the A.E.I. group of companies

METROVICK *Meters, instruments and relays*

G/A905

The people everyone relies on . . .



Glasgow Corporation have relied on Tudor Batteries for 23 years. British Railways use them, too—so do, for example, W. H. Boase & Co. Ltd., on the dock quays at Liverpool. In fact, Tudor batteries are part of the success story of many different types of enterprise; a decisive proof, if any were needed, of their outstanding reliability.

The experienced engineering staff of the Tudor Accumulator Co. Ltd. will be pleased to prepare the most economical battery scheme to meet your requirements.

Tudor Batteries for

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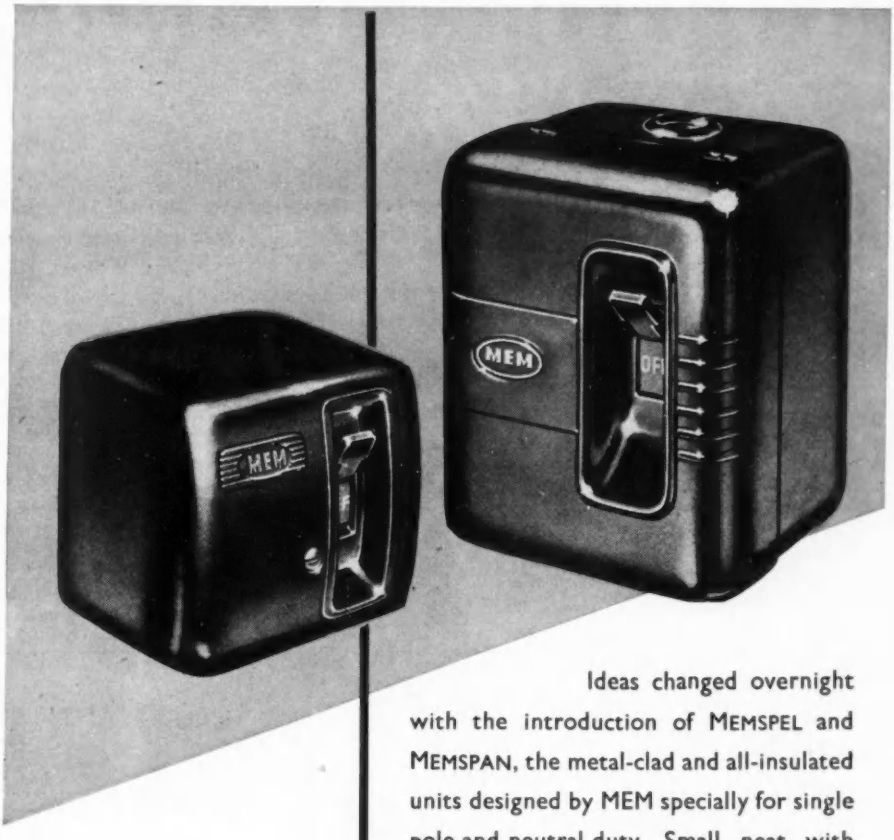
CABLE MAKERS ASSOCIATION
52/54 HIGH HOLBORN, LONDON, W.C.I. TELEPHONE: HOLBORN 7633



What shape is a switchfuse?

Ideas changed overnight with the introduction of MEMSPEL and MEMSPAN, the metal-clad and all-insulated units designed by MEM specially for single pole and neutral duty. Small, neat, with front operated slow break A.C. switch and choice of cartridge or rewirable fuses in interchangeable carriers, they set the style for today. Send for new Switchcraft Catalogue List No. 311.

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TYSELEY, BIRMINGHAM 11.
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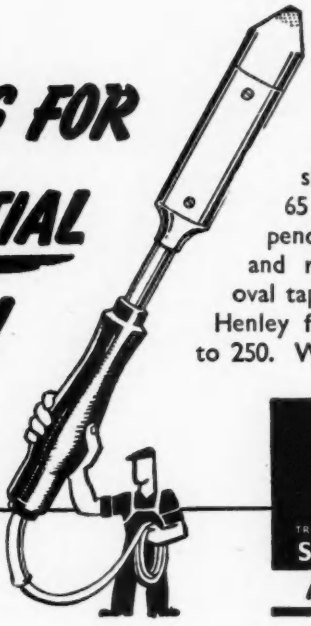

Use SOLONS for the jobs that matter—this modern precision tool makes soldering speedier, simpler and more reliable. 5 models: 65 watt with oval tapered and round pencil bit; 125 watt with oval tapered and round pencil bit; 240 watt with oval tapered bit; each with 6 feet 3-core Henley flexible. Voltage ranges from 100 to 250. Write for folder Y.10.

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HENLEY SOLON ELECTRIC TRADE MARK SOLDERING IRONS

FOR INDUSTRIAL USE

RENOWNED FOR RELIABILITY

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electrical heating appliances

- *INDUSTRIAL*
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The ARORA Company ROSEBERY STREET, LOUGHBOROUGH

Specialists for over 30 years.

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ENORMOUS

Reductions

IN HEAT LOSSES AND FUEL CONSUMPTION

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CYLINDER JACKETS

EETO Jackets are also made for Horizontal Cylinders, Square and Rectangular Tanks.

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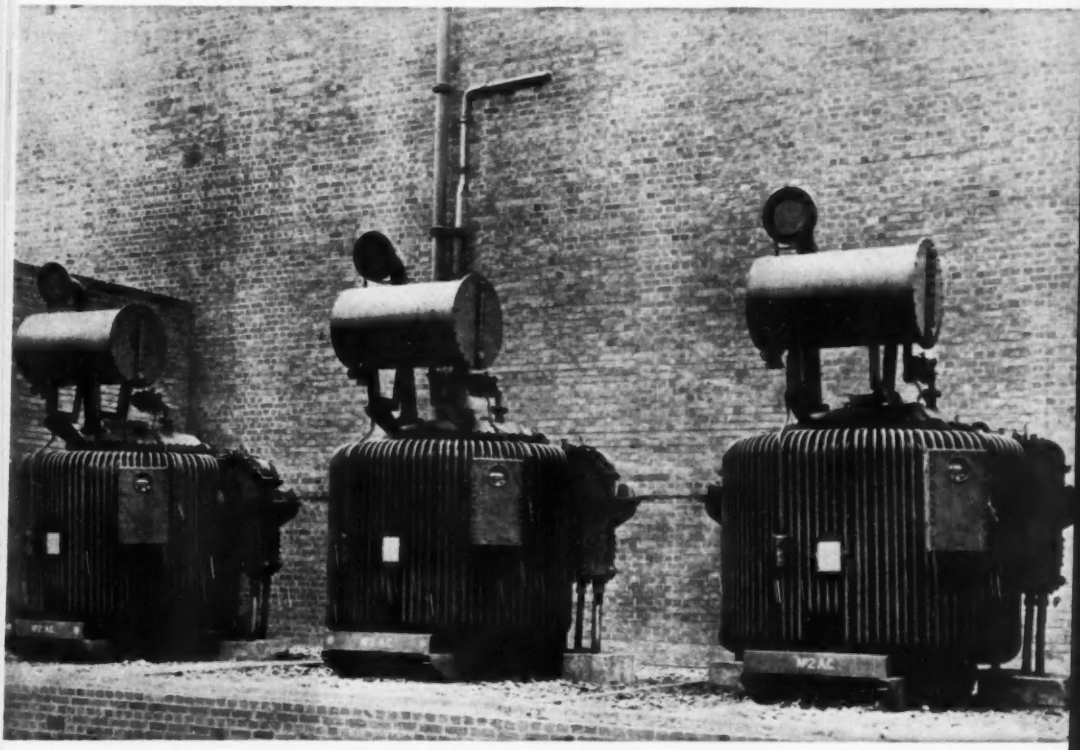
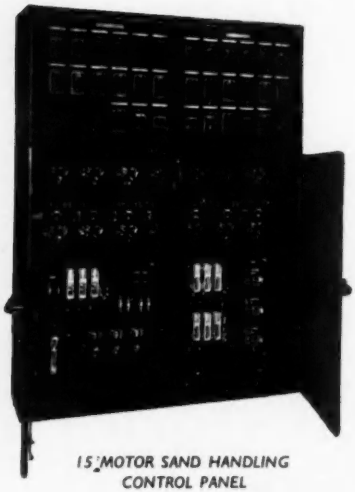


NECHELLS "B" POWER STATION

C.A. PARSONS & Co LTD

HEATON WORKS, NEWCASTLE UPON TYNE, 6



15 MOTOR SAND HANDLING CONTROL PANEL

IGRANIC ELECTRIC CONTROL GEAR

FOR . . .

EFFICIENT PROTECTION

OF VALUABLE MACHINERY AND FOR RELIABILITY SPECIFY....

IGRANIC CONTROL

OUR DISTRICT OFFICE STAFFS OF SPECIALIST ENGINEERS ARE READILY AVAILABLE TO ADVISE YOU ON THE SELECTION OF CONTROL GEAR APPROPRIATE TO YOUR PARTICULAR NEEDS

SPECIALISED CONTROL EQUIPMENT FOR....

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- COAL HANDLING
- COKE OVENS
- FOUNDRIES
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POWER LINE DIVISION, North Woolwich, London, E.16.
Telephone: ALBert Dock 1401

An addition to the range of 'FERGUSON PAILIN' Control Switches

RS60
RS25
RS20

It all adds up to ADAPTABILITY

Range now consists of:

RS20—20 *amps*, 230 *volts*, *A.C.*, *up to 6 poles.*

RS25—25 *amps*, 230 *volts*, *A.C. and D.C., up to 10 poles.*

RS60—60 *amps*, 230 *volts*, *A.C. and D.C., up to 4 poles.*

RC —*A "spring return to neutral" 3-position switch for use as a controller for Circuit Breakers or Governor Motors.*

FERGUSON PAILIN 'RS' switches have been designed to facilitate remote or local control of many types of equipment.

The 'RS20' is a selector and control switch for smaller circuits up to 20 amps at 230 volts A.C. It has been produced to supplement the types 'RS60' and 'RS25' switches, which have been adopted by many of the more discerning manufacturers of products requiring control switches. The importance of positive operation has been fully realised in the design of the components, and the small space required on the mounting panel makes the switch adaptable for use on many engineering and domestic products.

Catalogue S.P. gives detailed information. Please write to Publicity Department for a copy.

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Switchgear Specialists

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Distinguished Lighting Fittings in Aluminium Alloy

COUGHTRIE

LIST NO. SW6/1.GR 60 WATT

MANUFACTURED BY

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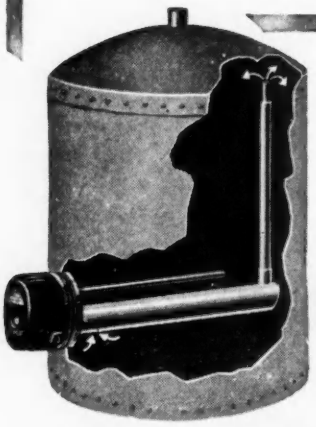
Have you a water heating problem?



. . . solve it with "Dunlow" electric Immersion Heaters and Circulators

Side Entry—Top Entry and External Types can be supplied. Full information on request

The easiest heater to fit
Side Fixing Type Circulator with mechanical flange 2, 3 and 4 *kw*

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White on Black or Black on White
Special colours to order

Blanks are always in stock and can usually be engraved to customers' requirements within 2-3 days.

STANDARD SIZES

3½" x 2"	2½" x 1½"	2" x 1⅛"
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Complete with self tapping screws for fixing

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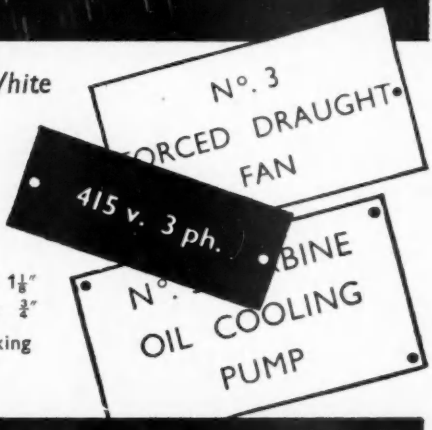

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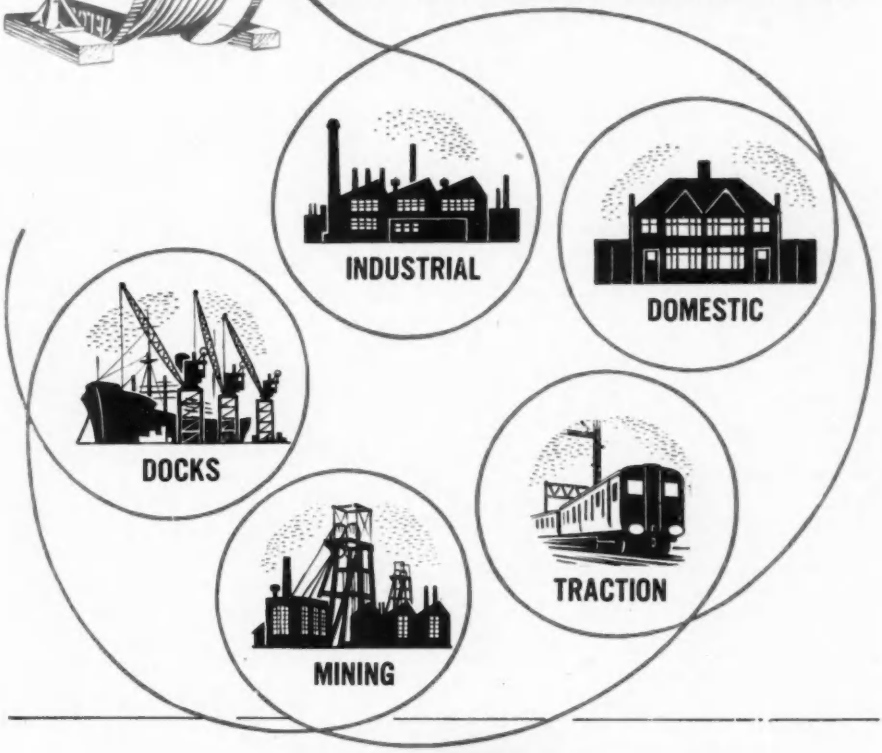

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THE TELEGRAPH CONSTRUCTION & MAINTENANCE CO. LTD.

Head Office: **22, OLD BROAD ST., LONDON, E.C.2.** *Telephone: LONdon Wall 7104*

Enquiries to: **TELCON WORKS, GREENWICH, S.E.10.** *Telephone: GREenwich 3291*

The Danfoss line of controls for refrigeration plants is known through years of experience in this country.

THE *Danfoss* CONTACTOR STARTERS

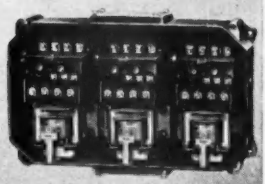
Now on the British Market-

For Wall Mounting

Water-tight Design

15 A Contactor Starters with overload protection

Triple-pole 15 A Manual Motor Starters



Star-Delta Switches, Reversers and Pole Changers for 15 and 65 A.

For Panel Mounting

Dust-tight Design

65 A Contactor Starters with overload protection

15 and 65 A Contactors

Contact our London Branch Office

Danfoss Manufacturing Company

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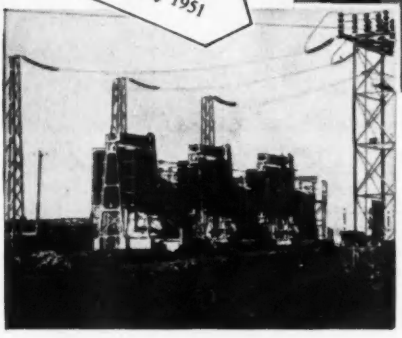
B T-H TRANSFORMERS

BTH Transformers for the State Electricity Commission of Victoria, Australia:–

Rating: 15-MVA., Type ON single-phase units for 45-MVA three-phase 220-kV bank.

The three units on test at the BTH Rugby Works — November 1950.

In commission in Australia — May 1951



We make *ALL* types of Transformers
also:-
Cast-in-concrete and Oil-immersed Reactors
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BRITISH THOMSON-HOUSTON
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Member of the AEI group of companies

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Gears without Teeth

Shell research people are constantly experimenting to find even better lubricants for use in gears. For specialised wear study, four-ball and two-ball machines simulate ingeniously the combined rolling-sliding motion that occurs in gear tooth engagement.

In another machine spinning bronze discs in loaded contact give an accurate representation of wear on gears in actual service. Speed, direction of rotation and diameter of the discs can be varied to allow for the wide variety of conditions found in practice.

What happens to oils in high-speed gears? That problem is studied at Thornton in gear rigs which turn at up to 15,000 r.p.m.

Shell research is not a rapid process because any one result has to be tested again and again, in theory and practice, before it is allowed to stand. The Shell Lubricant in *your* gears is the result of this kind of research-in-depth.

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Twenty-nine years of progressive leadership in electric water heating

In 1923 Sadia first introduced white enamel electric water heaters of pleasing appearance and scientific construction — still the basis of all modern designs.

In 1939 Sadia developed the type U.D.B., the first electric water heater designed for installation "under the draining board", incorporating two heating units — sold today in large quantities.

This was followed in 1946 by the Sadia type C.E.L. Coal-Electric water heater with the patented self-filling and self-venting calorifier — the most efficient and economical Sadia water heater.

In 1951 the 'U' series of Aidas immersion heaters included the first thermostatically controlled immersion heater for fitting in a $1\frac{1}{4}''$ screwed flange.

Now, in 1952, after 29 years, Sadia still leads the field for modern design, quality and performance.

SADIA
HOT WATER BY ELECTRICITY

AIDAS ELECTRIC LIMITED
Sadia Works, Rowdell Road, Northolt, Middlesex. Scottish Agents: W. Brown & Co., (Engineers) Ltd., 89, Douglas Street, Glasgow, C.2. Manufactured in South Africa by: Sadia Water Heaters (Pty) Ltd., 3-5, Newton Street, Village Main, Johannesburg.

Electrical Insulation

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Washers
Plates
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Heater Strips, etc.

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Mouldings, Commutator Vee Rings, Tubes, Covered Bars, Commutator Segments, Heater Strips, Sheet Material in Moulding, Flexible, Heat Resisting and Commutator Qualities, etc.

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Tubes
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Bobbins
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'Phone : KEYstone 4254 *Telegrams: Elmicmer, Easphone, London*

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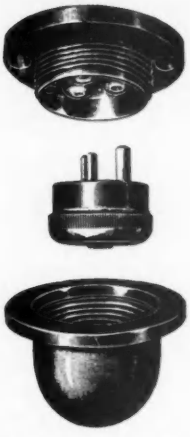
UNIVERSAL CEILING ROSE

(Formerly "GREGG")

IDEALLY SUITABLE FOR EXHIBITION AND SHOWROOM AS WELL AS FACTORY AND HOUSEHOLD USE

Provision for earth connection. Fittings become interchangeable and removable for cleaning in a moment; no need for switching off or removing fuses. This fitting will support the heaviest domestic or industrial pendant or fluorescent fitting. Installation time is cut by half. 2" fixing centres.

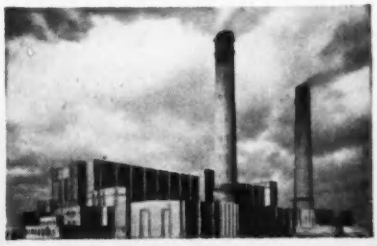


British Patent 583780
Colours: Black, Brown or White

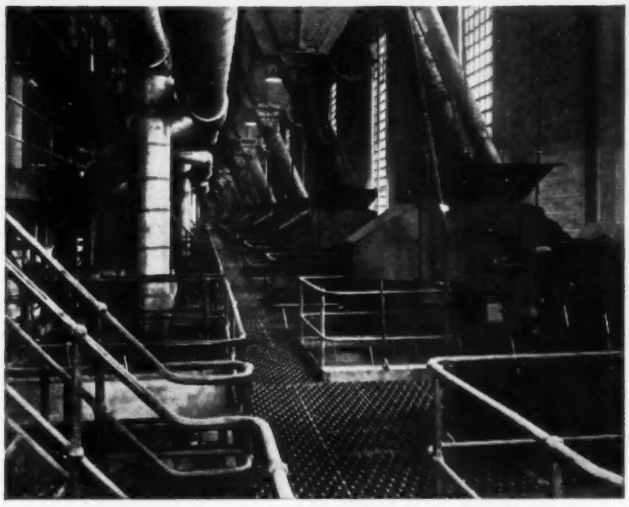
RANTON & CO. LTD.

COMMERCE ROAD, BRENTFORD, MIDDX. **Phone : EAL. 5808 (3 lines)**

Manufacturers of "Rock" Electrical Accessories



CROYDON 'B'



A view along the line of coal weighers feeding the pulverisers

Civil Consulting Engineers: C. S. Allott & Son
Consulting Engineer: F. N. Rendell-Baker, M.I.E.E.

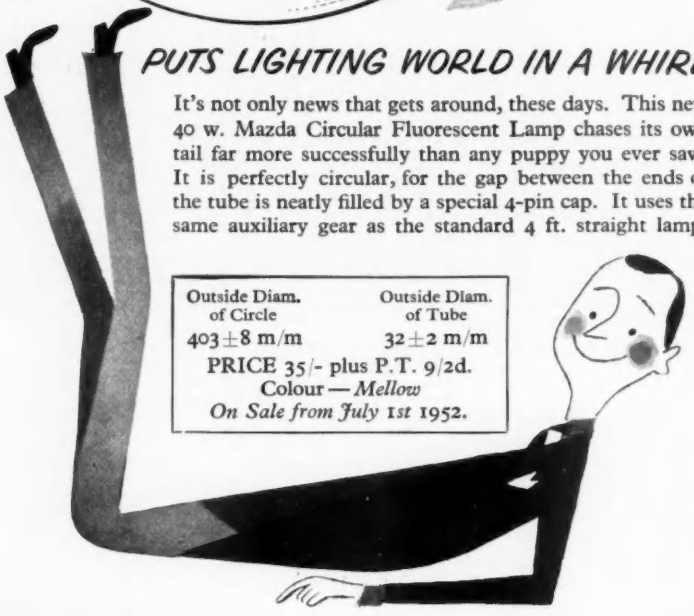
The first two sections of the new Croydon "B" Generating Station will contain eight Simon-Carves high-head pulverised fuel fired boilers; six are already in commission and the other two are scheduled to steam during 1952. These eight units, each with a maximum continuous rating of 320,000 lbs. per hour at 875° F and 650 lbs. per sq inch pressure, supply steam for the generation of 210,000 kilowatts. The ash and dust handling plants are also by Simon-Carves. Fine flue dust is collected and taken to the disposal bunkers by a pneumatic handling installation, the distance from the bunkers to the farthest dust collection point being approximately 1,200 ft.

Steam power by **Simon-Carves Ltd**

STOCKPORT ENGLAND

S.C.46

Mazda
Fluorescent Circle



PUTS LIGHTING WORLD IN A WHIRL

It's not only news that gets around, these days. This new 40 w. Mazda Circular Fluorescent Lamp chases its own tail far more successfully than any puppy you ever saw. It is perfectly circular, for the gap between the ends of the tube is neatly filled by a special 4-pin cap. It uses the same auxiliary gear as the standard 4 ft. straight lamp.

Outside Diam. of Circle	Outside Diam. of Tube
403±8 m/m	32±2 m/m

PRICE 35/- plus P.T. 9/2d.
Colour — *Mellow*
On Sale from July 1st 1952.

Mazda *lamps stay brighter longer*

THE BRITISH THOMSON-HOUSTON CO. LTD., Crown House, Aldwych, London, W.C.2
(Member of the A.E.I. Group of Companies)

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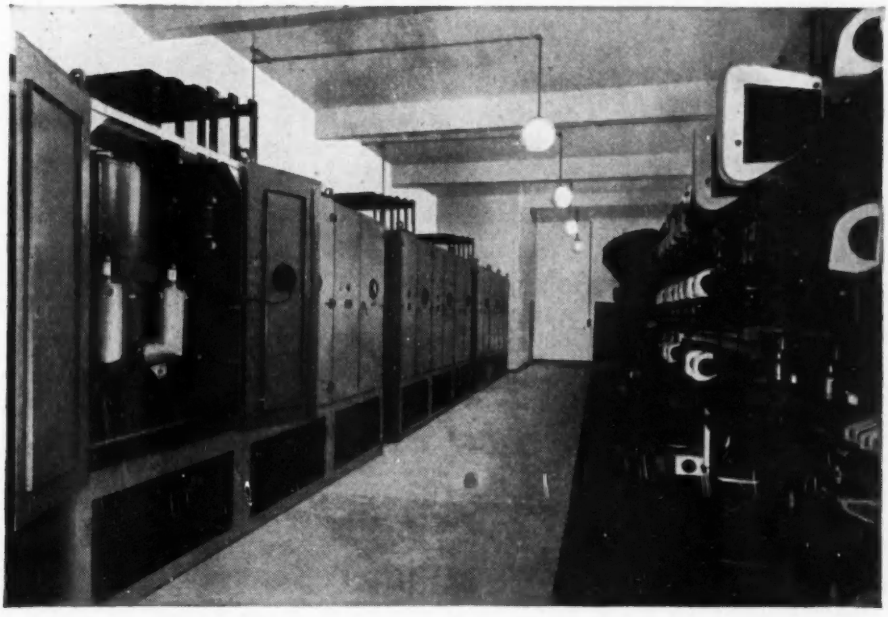
'ENGLISH ELECTRIC'

mercury-arc rectifiers



D.C. Power for Steel Works

The 'ENGLISH ELECTRIC' sealed steel tank mercury-arc rectifier, with its simplicity of operation and minimum maintenance requirements is particularly suitable for unattended sub-stations. One of its many industrial applications is in steel works for supplying D.C. power, both for main mill motors and auxiliary services. The illustration shows a sub-station containing three 1,500 kW 'ENGLISH ELECTRIC' rectifiers supplying power to the main drives of a Cross Country Mill at the Round Oak Steel Works.

The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Rectifier Sub-Station Department, Stafford

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

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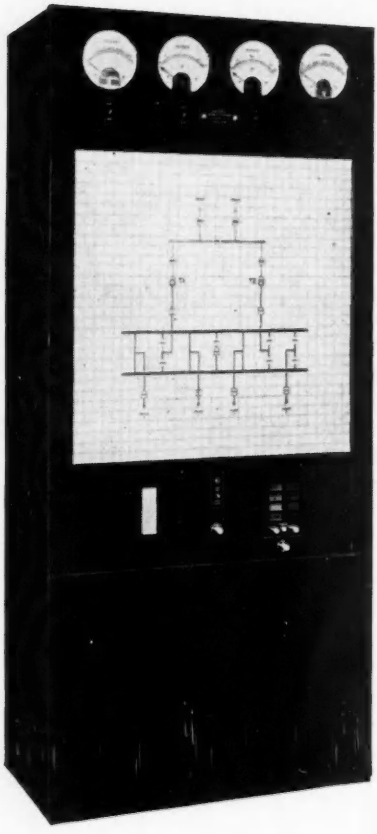
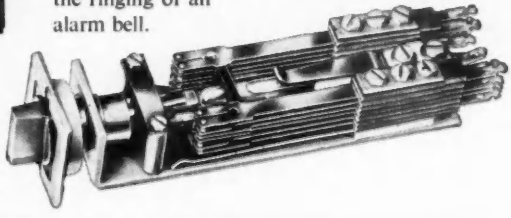
* *An important development*



MOSAIC DIAGRAM *with* CONTROL FACILITIES

With this equipment the engineer can exercise both control and supervision directly from the mosaic diagram. Each symbol incorporates a rotary switch for selection purposes and a miniature lamp which lights whenever the symbol does not line up with the position of the apparatus it represents. Selection is made by merely turning the appropriate symbol to the new position, a coded impulse train then automatically selecting the particular remote equipment. When the "selection correct" signal is returned, the desired operation can be performed. The tripping of circuit breakers at the remote station is automatically indicated at the control room by the flashing of the discrepancy lamp and the ringing of an alarm bell.



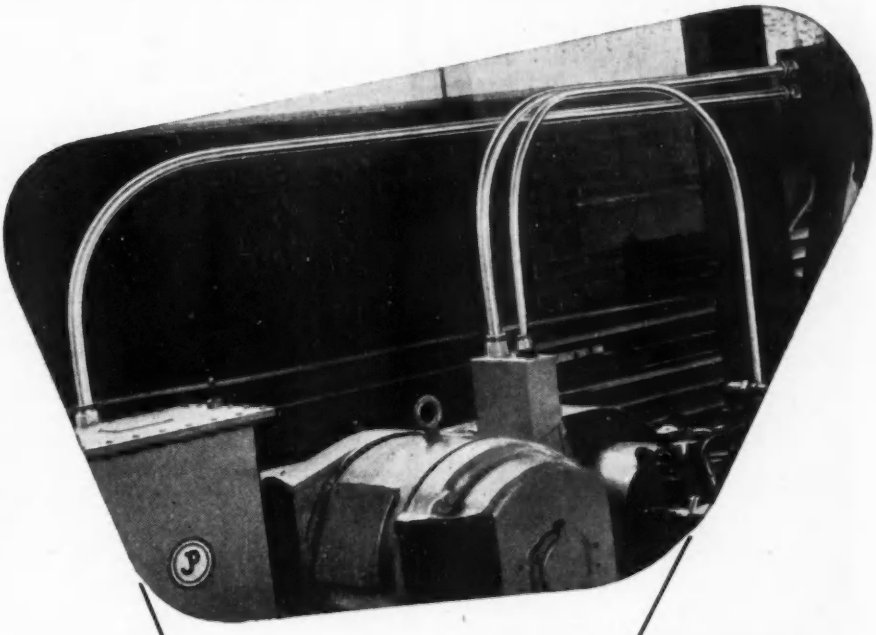
Symbol with rotary switch and discrepancy lamp

SUPERVISORY REMOTE INDICATION AND CONTROL EQUIPMENT.

AUTOMATIC TELEPHONE & ELECTRIC CO. LTD.

Strowger House, Arundel Street, London W.C.2. Telephone: TEMple Bar 4506.
Telegrams: Strowger, Estrand, London. Strowger Works, Liverpool, 7

AT. 4501-CX23



NO VISIBLE MEANS OF SUPPORT . . .

. . . AND NO INVISIBLE MEANS EITHER! The strength and lightness of an aluminium sheath frequently eliminates the need for supporting structures—one more financial advantage of using

J. & P. ALUMINIUM SHEATHED CABLES

British Patent Nos. 627815 & 627793.

JOHNSON & PHILLIPS LTD.
CHARLTON LONDON S.E.7
The mark that means that "little more" in quality

THE SIGN OF THE OLYMPICS
SIERAY
BRITISH MADE
THE SIGN OF QUALITY
Look for this mark on the NEW
SIERAY
Fluorescent CIRCLES
by
SIEMENS
16" diameter, 40w. mellow only. Price 35/- each (Plus Purchase Tax 9/2)
SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED, 38/39 Upper Thames Street, London, E.C.4
Branches at-Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield.

ELECTRICAL TIMES

Vol. 121 No. 3159 THURSDAY, 22 MAY 1952

PUBLISHED EVERY THURSDAY

SIXTY-FIRST YEAR OF PUBLICATION

CENTRAL CONTROL OF CITY POWER NETWORKS
by C. Gordon White, B.SC., A.R.C.SC.I. 929

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Editorial

SOCIETY FOR TECHNICIANS

IN amending its rules to embrace those who fall within the I.E.E. definition of "technician," the Association of Supervising Electrical Engineers has taken an important step, one which should lead towards more comprehensive representation of electrical manpower for the mutual exchange of technical experience. The need for some association for technicians in the electrical industry was accepted by the Institution in the report on the "Education and Training of Electrical Technicians" which appeared in 1950 with joint I.E.E.-B.E.A.M.A.-R.I.C. sponsoring. It was at the London meeting at which the report was discussed that representatives of the A.S.E.E., while demurring at the width of the definition of "technician," argued strongly that their association had the right to be considered the principal society for such men. This drew an immediate response from Col. Leeson, speaking for the I.E.E. Council, who promised I.E.E. interest for any suitable organisation, and since that time there has been close co-operation between Institution and Association to resolve and remove points of difference. The result is an extension of the Association's scope, as effected by slight alterations to the rules accepted at the Annual Conference held in London last week-end. An addition to the already considerable influence of the A.S.E.E. in electrical affairs is to be expected from this move, which reflects credit on all concerned.

SOLID-FUEL SOLILOQUY

LAST WEEK the use of solid fuel achieved the distinction of a discourse at the Royal Institution, for the lecturer was Mr. J. S. Hales of B.C.U.R.A., who chose as his subject "The science of domestic heating." The address was most informative and instructive, largely, Meteor felt, because Mr. Hales avoided his subject almost entirely. He told the fascinating story of early attempts to improve the efficiency of the coal fire and then in contrast gave a demonstration of the elaborate modern equipment used to measure efficiencies of solid-fuel appliances. But of the major factors in domestic heating there was scant mention. Of solid fuel's boon companion —gas—there was not a single word, and even smokeless fuels were dismissed summarily in an opening sentence which affirmed that coal would be the major available domestic fuel for some years to come. Electricity itself only received mention in the form of an apology, because Mr. Hales had to make use of the convenience of electric fire elements to demonstrate how radiant heat from a coal fire is measured. Of contentious matter there was little; all very right and proper for such an august occasion. But was Mr. Hales playing fair to entitle his address "The science of domestic heating" and then ignore two of the three principal heating methods that are in everyday domestic use?

ELECTRICITY ON SHOW

IN the lengthy report of the I.E.E. Council which is summarised in our pages this week there is a small paragraph which holds a special interest for Meteor. Readers may recall how the ELECTRICAL TIMES drew attention, three years ago, to the unsatisfactory nature of the electrical power section of the nation's permanent exhibition of technology at the Science Museum. It is now announced that, as a result of close consultation between the I.E.E. and the Museum authorities, an appeal has been issued which has the object of building up a display fund. At present the appeal is directed to industrial associations and nationalised industry who have good reason for according their support in the goodwill that a first-rate exhibition can engender. It is possible, of course, that the

present pressure for government economy may, as has so often happened in the past, delay development at the Museum, but the appeal seems designed to meet this possibility. One important step at least has been taken: floor space has been extended as a result of the building which was carried out for the Festival of Britain science exhibition and the chance this presents for a reasonably complete electrical power section should not be missed.

CENTRAL CONTROL

ONE of the most difficult decisions that has to be taken when any scheme of automatic indication and control is under consideration is what provision is to be made for future extension. Debate has often centred round this point, which makes the special merit of the control system which is described in this week's principal article of outstanding value. It provides the possibility of extension with little addition of apparatus at the central control station, essentially because it concentrates on giving full information concerning the immediate point of interest. It is, perhaps, strange that the full possibilities of this electrical development have been more widely applied on railway and signal control schemes than they have to electricity supply systems. Yet there must be many situations where the installation of a system similar to the Manchester control described would result in greater speed and certainty of working.

PHOTO-CELLS FOR SAFETY

CURTAINS of light, operated in conjunction with photo-electric cells, have advantages to offer for most alarm and guard duties. The use of such devices to protect operators working dangerous machinery has tended to be discouraged in the past by the Factory Inspectorate; they have preferred the more positive action of a sturdy mechanical screen. It is undeniable, however, that such mechanical guards often slow down the rate at which a machine can be worked, and that photo-electric systems, simply because they are free from any solid barrier, do not suffer from this disadvantage. So it is satisfactory to find from the newly published report of a Factory Department Committee (that on press brakes) that the standard of performance of photo-electric apparatus is now considered high enough for its application to such vital duties to be recommended. Developments in circuit technique, especially for the provision of continuous and automatic checks of effectiveness and of preventing "cheating," have allowed the required level of reliability to be attained. At the same time, a specification is satisfied that may require the electrical system to operate in 0·06 seconds. It is no small achievement on the part of designers to give this speed of action, which allows the machine to come to a standstill in 0·3 seconds of the light screen being penetrated.

RESTRICTION ON CREDIT

DESPITE the effectiveness of the recent hire-purchase regulations in reducing sales of many electrical appliances, it seems that the Government's financial experts remain dissatisfied with the general state of this form of consumer spending. A new move is now planned, this time through the agency of the banks. For some time these have been restricting advances for hire-purchase financing to 1947 levels, and now they are being asked to harden their attitude still further, by introducing for the first time a reduction of this ceiling. How far this will affect electrical traders and, through them, manufacturers seems uncertain. The restrictions on hire periods and minimum initial deposits have exercised a definite restriction in this field, while presumably rising prices and the effects of purchase tax have caused a continuing "cut" so far as the volume of hire-purchase business is concerned. Thus the real result of this additional action may be relatively small. None the less, it has its significance, in demonstrating once more the firmness of the stand the authorities are making in this matter of consumer spending, and of the hard path electrical manufacturers and their distributors will have to tread for some years more.

Meteor

Central Control

OF CITY POWER NETWORKS

Supervisory system is used for operation of Manchester 33 kV substations

By C. GORDON WHITE,* B.Sc., A.R.C.Sc.I.

THE introduction last year, in No. 1 Sub Area of the North Western Electricity Board, of a separate system of common diagram supervisory control for 33 kV substations in the Manchester area, is a noteworthy step in the provision of such facilities for large urban areas. The various stages in the progress of supervisory control in Manchester are worthy of review and indicate how far-seeing were the engineers in this large industrial area, as far back as the early 1930's, in introducing this relatively unknown tool for substation switchgear control.

Their early experiences were gained on control systems serving individual substations, some of which were by any standard exceptionally large and important switching centres. The functions included control and indication of breakers and transformers with certain miscellaneous alarms and selected meter readings of busbar volts and feeder amps with "on demand" facilities. Experience gained in the 1930's with several such equipments, added from time to time to the original installations, demonstrated the advantages of such control and in 1942 a major step forward was taken, after much deliberation and examination of the problem, by the introduction of a comprehensive centralised system intended to cover ultimately all the 6·6 and 11 kV substations in the city network, estimated to total about 600. The initial scheme installed catered for 79 substations and in the main, breaker control and indication alone was catered for. Since 1942 further stations have been added to the scheme bringing the present total to more than 130, and its ultimate scope may well exceed the 600 stations envisaged.

* *Remote Control Eng. Standard Telephones & Cables Ltd.*

Master Control Panel

It will be remembered that the controls on this system are effected from a desk-mounted master control panel, carrying a single line mimic diagram, which can represent in whole or in part the diagram for any of the substations connected to the system. The keys, lamps, etc., representing symbolically the breakers, etc., controlled and indicated, are set appropriately in this diagram, together with numerical display selector switches, which are automatically set to indicate the identity (code or other symbols) of the breakers, when the control panel is appropriated by selection and assumes the identity of the selected remote station. The wall diagram, used for reference in conjunction with this master panel, is an outline of the 6·6 and 11 kV system, showing the substations in their

Fig. 2. Close-up of part of the 33 kV control panel

approximate geographical disposition and with the main connections between the stations.

The detailed diagram of the station can be interpreted from the master panel and further analysis of the system is possible on detailed diagrams covering various zones of the city network, together with filed drawings or cards showing the intimate details of the various stations themselves. The whole scheme has been conceived and planned to deal realistically with the constant system changes which are inherent in such large metropolitan networks. The master panel can represent in diagrammatic form any substations existing or likely to be added to the system and the wall diagrams, consisting simply of tape on mosaic tiles, permit the user to modify the diagram as required without returning anything to the factory of origin or without further reference to the manufacturer of the equipment.

Control Room Layout

Figure 1 gives a general view of the control room. To the left can be seen two of the 33 kV individual control panels which operate in conjunction with control equipment, which has been in constant use now for over 15 years. Next to these is the 33 kV wall-mounted system diagram, whilst adjacent thereto, filling the background, is a wall diagram for the 6·6 and 11 kV networks. Both wall diagrams are carried out on a mosaic type panel composed of plastic tiles with rear electrical connections, whereon substations are represented by rectangles suitably numbered and named (with single calling lamp for stations equipped with supervisory), whence run horizontally and vertically the interconnections between stations in distinctive colours, thus providing a very clear outline of the basic system and ready means for revision as may be required. The large curved desk in the centre foreground mounts the master control panel for the 6·6 and 11 kV systems, this being flanked by two control operators' writing positions complete with telephones and associated calling keys. To the rear of this desk can be seen the supervisor's desk in which are accommodated the various detailed system and station diagrams and equipment records, where they are readily available at all times for reference when dealing with systems disturbances, outages and maintenance switching operations.

Extended Application

Experience gained on this large central scheme—the first of its kind we believe in the world—has encouraged the engineers to apply the same operating principles to the relatively more important 33 kV city network which, too, is constantly undergoing extension and modifications. The limitations of space at the control centre at Dickinson Street also dictated that something must be done if the control of this growing systemis to continue to be directed from this or other suitably geographically placed centre.

It was decided that the basic principles of the existing CD system were adequate for 33 kV system control, but lack of space necessitated the accommodation in this case of the master panel on the wall of the control room, and to limit the disturbance caused by this alteration to a minimum, this control panel was located in the vacant wall space, seen in Fig. 1, just beyond the supervisor's desk. The panel, a fuller view of which can be seen in Fig. 2, occupies a space approximately 10 ft long by 10 ft high.

As with the earlier system the station switching details are concentrated on the master panel, the associated system line diagram—in this case located diametrically across the room in front of the larger desk—showing in outline the substations and the various main interconnections.

For obvious reasons, the breaker symbols, disposition of circuits, etc., as used before, have been retained and the general control procedure has also been made identical with that used in the desk-mounted system. Referring to Fig. 4, which gives a close-up view of the upper part of the 33 kV control panel, each breaker is represented by two lamps (red and green) and a

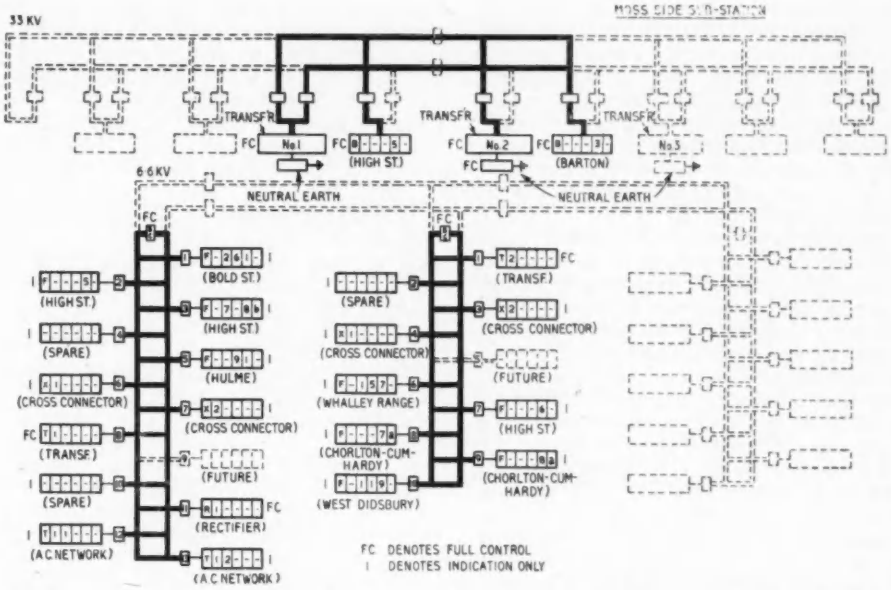
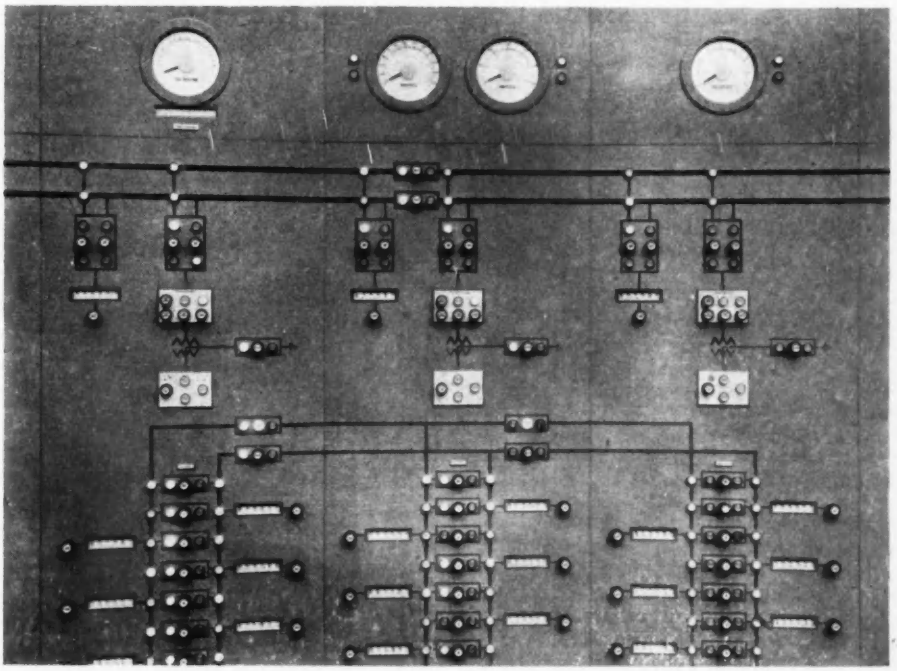


Fig. 3 (above) shows a typical substation diagram superimposed on the master diagram, while in Fig. 4 (below) is shown a view of the actual panel containing the master diagram and associated meters



selection key (with pilot lamp incorporated), whilst single lamps serve to indicate for bus selector switches to which busbar (front or rear) the appropriate breaker is connected. The numerical indicators, one per breaker on the master panel, are of the 6 digit type and are automatically set to display the code reference (or number) of the breakers occupying those relative positions on the diagram at the substation under control.

The need for flexibility can be demonstrated also by reference to Fig. 4. Whilst at some substations 33 kV feeders, transformers, etc. are connected to the double busbars by bus selector switches, in other cases duplicate breakers are provided for each circuit, and the common diagram layout has been arranged to cater equally for either arrangement or for any combination of single and duplicate type switchgear which might be envisaged.

For the 33 kV substations selected meter readings of busbar volts and feeder amperes had been provided on the older individual schemes, and it was decided to incorporate similar facilities in the new equipment. The four meters—see Fig. 4—are from left to right respectively, tap position indicator, feeder amps (2) and busbar volts. Underneath the tap position indicator a facia displays the number of tap positions available on the transformer selected, this being achieved by special information circuits. Each indicating ammeter is provided with two scale ranges 0-120 and 0-360 for the left-hand meter, 0-600 and 0-1,800 for the right-hand ammeter; twin lamps associated with each ammeter confirm the scale range which applies to the reading selected. The meter selection keys are located on the diagram each adjacent to its associated breaker and next to the feeder indicator; for transformers these keys are on the symbol escutcheons distinctively coloured white. The 33 kV control scheme has been designed with a capacity for 48 substations; the circuits have been so arranged that the system can be extended if required beyond its wired capacity. The common equipment located at the control station, which is associated in the main with the control panel and diagram display, being so much less in cost and space occupied than for a group of individual systems, it was felt that this could well be duplicated thus giving 100% standby capacity for the control room equipment. The changeover key, to give the necessary switching usually carried out on a day-by-day basis, can be seen in the left-hand lower part of Fig. 2.

Each remote station is connected to the central point by two pairs of small gauge telephone type conductors, one pair being for the control and indication signal transmission (both way) and the other for establishing the selected meter or tap position reading one at a time for as long as may be desired, without interference with subsequent control operations.

The meter readings are derived from secondary coupling units fitted in the secondary windings of the voltage and current transformer primary circuits at the substations, whilst tap position readings are derived from multi-point position indicating switches via a ratiometer circuit which compensates adequately for variations on the 50 V d.c. supervisory supply which is used for this indication.

Coding Scheme

The coding scheme provides capacity for the following circuits.

Indication.—132 (single aspect) for bus selection position, bus coupler racked out: misc. alarms. 132 (double aspect) for breaker position, transformers auto/manual, etc.

Controls.—75 for Breakers close/trip, Transformers auto/manual, Transformers raise/lower.

Meter Readings.—66 Selection for Amps, Volts, Tap positions. The control diagram is arranged for the following:—

(*a*) Three 33 kV transformers controlled by single breaker with selection or double breakers,

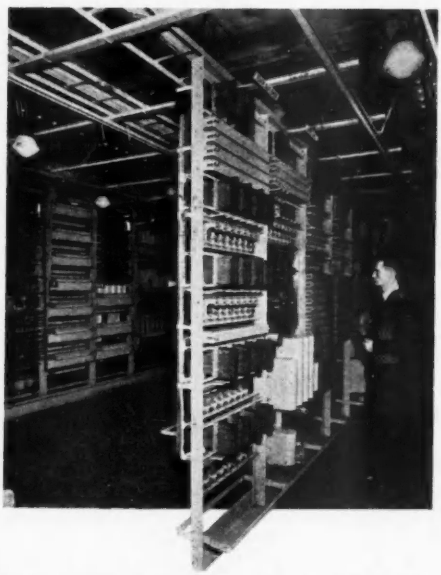


Fig. 5. In this view the assembly of telecommunications type equipment on racks in the central control station apparatus room is readily apparent

together with ancillary controls, indications, alarms and ammeter readings; also voltmeter readings on the secondary side of each transformer. (*b*) Six 33 kV feeders of either single or double type and ammeter readings. (*c*) Two 33 kV bus section switches. (*d*) One 33 kV bus coupler switch.

Fig 6. Control cubicle in a 33 kV substation

(*e*) Three 6·6 kV or 11 kV sections, the first having 13 switches and the other two having 10 switches each, all with ammeter readings. (*f*) One 6·6 kV or 11 kV bus coupler for each of the three sections. (*g*) One 6·6 kV or 11 kV bus section switch for each of sections 1-2 and 2-3. (*h*) One 6·6 kV or 11 kV isolator for each of sections 1-2 and 2-3. (*i*) One 6·6 kV and 11 kV neutral earthing switch for each of the three transformers.

(*j*) Trolley-bus traction facility with indication of the "d.c. breaker open alarm" feature and the indication and reset of five lock-outs. (*k*) Thirty fleeting and non-fleeting alarm annunciations.

In Fig. 3 is shown, in dotted outline, the master panel diagram layout intended to cover the largest station which might be connected on the system. Superimposed thereon is the diagrammatic outline for one of the stations initially connected to the scheme. The settings on the 6 digit numerical indicators are shown against the various circuits. It will be observed from the upper part of the diagram that whilst some circuits are connected to the double 33 kV busbar by duplicate breakers, other circuits are connected thereto via a single breaker and twin selection switches.

Diagram Cards

For operational purposes, the supervisor's desk houses diagrams in card form for each station similar to that shown in Fig. 3, each such diagram carrying on the reverse side all appropriate details of the various circuits concerned, including relay settings, C.T. ratios, capacity, type, make, serial numbers, etc. By this means very full details—much more than could be shown on any individual mimic diagram system —are conveniently recorded on a standard card which is readily accessible whenever required.

The important feature of the common diagram system and one which is not obvious at first glance, is the economy in the amount of equipment required at the control station. In systems hitherto used, provision must be made in the control station apparatus room for additional apparatus as and when further substations are added to the network. Not so with the common diagram, where the necessary apparatus to operate the common panel having been provided initially, little addition is required subsequently at the central point.

Fig. 5 gives one view of the apparatus room at Dickinson Street. The apparatus, some strip mounted and some mounted on jack-in panels, is accommodated on open type racks. The equipment shown includes the centralised testing apparatus rack whereby all jack-in relay panels, both at control and at outlying stations can be functionally tested as also the standby common equipment referred to above.

Fig. 6 shows a typical apparatus cubicle in one of the 33 kV substations. Much of the apparatus here is mounted on jack-in panels which greatly facilitates maintenance. Apparatus for substations as in this case, is mounted in a robust floor mounting steel cubicle, where special provision is made to exclude dust.

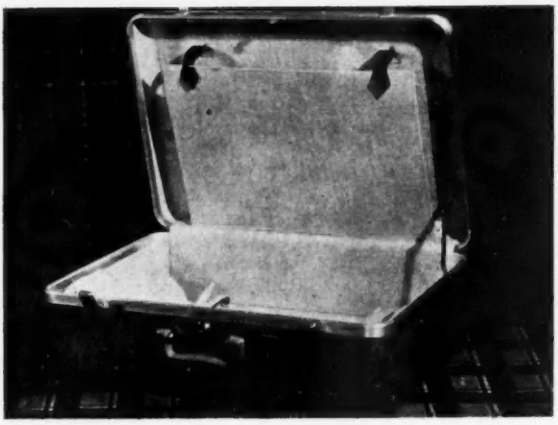
Application

During the post-war period, equipment incorporating common diagram principles have been supplied with marked success for power supply schemes on railway traction systems at home and abroad. The fact that the operating requirements of the railways are, in many respects, different from those for a metropolitan or urban network has necessitated an approach to the problem contrasting in some respects with that applied in the Manchester installations. The distinctive need for speed of operation in railway working has been satisfied by the provision of duplicate master control panels (equivalent to the common diagram panel in the case of Manchester), which enables two operators to effect controls simultaneously and independently at any two remote stations. Incidentally, this duplication provides 100% standby, both as regards the operating panel in the control room and the associated apparatus in the adjacent apparatus room, a provision which cannot be considered on orthodox systems because of the excessively high cost which would be entailed. The virtues inherent in the common diagram system have been clearly demonstrated also in the railway field

where, once the initial installation at the central station has been completed, further extensions within the compass of the scheme can be undertaken, without interfering with the control centre itself and in the knowledge that such extensions can be carried out much more economically than with any known alternative schemes in use for central control.

Without a doubt the Manchester installation, as also later common diagram systems, have proved conclusively that where comprehensive control facilities are required, such as on metropolitan and urban networks, these can be incorporated in reliable and economical control schemes, which should make for more efficient working and better service for consumers. In Britain alone there are many city networks, possibly not so large as Manchester, where there must be a real need for systems combining the main features of the Manchester installation with some of those applied later with such success on Bri i h Railways, and extended use of such control schemes in the near future may therefore be expected.

Glass-plastic Laminates



The illustration of a small suitcase by H. Koch & Sons & Owens-Corning Fiberglass Corp., which was exhibited at the recent Glass-Resin Convention is an excellent example of the use of glass fibre as a reinforcement for plastic

THE use of glass fibre as a reinforcement for plastics formed the subject of a series of papers given at a Convention held last week at Leamington Spa, under the auspices of Fibreglass Ltd.

The papers covered a wide field, ranging from the technical processes involved to the final applications. Apart from the service uses of these combinations for radomes, high strength edgings and other aircraft uses, the most interesting paper as far as the electrical industry is concerned was that given by Mr. K. Hyde of Ashdowns Ltd., on "Fibreglass Based Laminates for Electrical Applications."

This explained the purpose of employing Fibreglass as the filler material for laminates and gave comparisons of heat resistance with conventional paper and fabric based laminates. The methods of preparing the Fibreglass cloth for treatment were described, and special considerations necessary with silicone resins dealt with. This latter combination possesses outstanding properties for electrical work because of its capability for standing up to high temperature and its resistance to humidity.

An appreciation of the uses to which these laminates can be put was given by Mr. C. E. Bacon of the Owens-Corning Fiberglass Corporation. He dealt mainly with developments in the U.S.A. and also described the processing of the material.

For delivery boxes and trays, reinforced plastic proved most satisfactory because of its light weight and non-denting characteristics. Weight savings of up to 50% were realised, and rough handling and steam sterilisation had little or no effect on these materials. In the appliance field, complete tub assemblies for automatic type washing machines had been made. Here the material was little affected by the detergents in common use by the housewife. In the refrigerator industry it was anticipated that large moulded one-piece units would soon become available.

Complete automobile bodies, including fenders, had been moulded complete at a far lower price than would have been possible by using metals, and in this connection it was remarkable that reinforced plastics were more easily repaired than metals and at a lower cost.

The techniques of processing involved the vacuum or pressure bag technique for moulding, continuous lamination by pulling an impregnated sheet of glass cloth or mat through an oven, centrifugal casting and the normal extrusion processes.

Our readers' views ...

Power Station Statistics

AS the Engineer wholly responsible for the first Annual Return of Generating Station Fuel Consumptions in February 1922 and closely associated with all of them until the final issue for 1947, I support very strongly your editorial comments on "What is a Station."

You can imagine that during the 25 years of publication many changes were made, but throughout the entire period I always insisted that a station had to be physically separated before being considered as such, and even then the Electricity Commissioners took the view that in the case of stations which had received consent as "extensions," these could be given individual figures but a combined total must be taken as the overall figure. Therefore Barking "A" and "B" and Hams Hall "A" and "B" were treated as one station although separate figures were given.

These statistics were a "best seller," being looked upon as both fair and accurate, and the turbine manufacturers were very glad to quote the results in their advertisements.

If now it has been decided to publish results of individual units divided from each other by a chalk line, then any comparison with other similar units becomes impossible unless a full station operating schedule is given in each case, and I can only regret the passing of an annual return which had almost as much interest to the supply industry as the position in the league of their favourite football team.

Alan N. East

ABBOTS LANGLEY C.B.E., M.I.E.E.

◆ ◆ ◆

Coal Handling

YOUR correspondent, Mr. C. Oppenheimer (May 8), says that the use of large self-discharging wagons would entail the reconstruction of several hundred miles of siding at small local stations.

Evidently he does not realise that these sidings, as well as those privately-owned, have been built to the same standard gauge as the rest of the lines all over the country, and that 80-ton locomotives (which are larger) actually run about in all of them.

Instead of ordering, say, a 10-ton truck a day, a coal merchant at a small station (who supplies farmers, and others, for miles around) would order a 60-ton self-discharger once a week—so securing a substantial reduction in transport costs. A mechanical shovel should be kept at every station to pick up coal and other minerals and drop them into road vehicles. In many places, the wagons actually drop coal into bins.

Similar conditions apply to large ordinary open and covered goods wagons.

E. R. B. Roberts

ST. NEOTS

◆ ◆ ◆

Reactor Starting

TO those concerned with the application of electric motors to industrial drives the article by Mr. J. Griffin (May 8) will be a useful reminder of the above form of starting. As compared with the star-delta device the reactor does make available a welcome increase in acceleration torque at a particularly useful section of the speed-torque curve.

But one must not overlook the fact that with this method of reduced voltage starting, the locked rotor torque is appreciably lowered if the voltage at the motor terminals is much below rated voltage; as may quite normally be the case in this country. First of all there is the permissible voltage drop of up to 7½% allowed by I.E.E. Rules to cover installation contingencies; then the rated voltage at the consumers' terminals is subject to a tolerance of 6% (more likely to be minus than plus these days); and finally there is the unspecified amount (at least 5%, sometimes 10% reduction) used by the B.E.A. in their load-shedding manœuvres. The net result of all these is that with the reactor starting there may not be available sufficient breakaway torque to overcome static friction.

For motors up to 5 h.p. undoubtedly the most satisfactory method of starting is direct on, as was recognised during the last war by a Statutory Rule and Order. Moreover, the report of the Anglo-American productivity team on Electric Motor Control Gear showed quite clearly the benefits that would accrue by a simplification of the varying patterns of control gear in favour of the direct on starter.

However, there may be certain cases, particularly with medium-size and larger motors, where only reduced voltage starting is permissible and then the reactor method undeniably has certain advantages; and these

could be maintained even in the adverse conditions mentioned above by the use of high torque squirrel-cage motors.

I feel, therefore, Mr. Griffin is to be commended for the clarity with which he has stated the case for this relatively little-known method of tackling a familiar problem.

A. N. D. Kerr

ORPINGTON A.M.I.E.E.

◆ ◆ ◆

A Policy for Fuel

I TOO have one of the modern solid fuel burning appliances and, unlike Mary E. Byrne, I find that (*a*) there is a very appreciable reduction in fuel consumption, (*b*) it will burn almost anything and will even char the average grade of coke and (*c*) it can be banked up overnight, merely needing a thorough raking when it has got going again in the morning.

For occasional use, and for cleanliness at all times, there is of course nothing to compare with electric heating; but for solid satisfaction give me a fire I can poke and worry.

T. J. Barfield

ROBERTSBRIDGE, SUSSEX A.M.I.E.E.

◆ ◆ ◆

I SHOULD like to answer Professor Simon's letter in your issue of May 8.

The Professor has changed his ground and now refers to the morning and mid-day peak, whereas in his letter of March 27, his words were "at the mid-day peak of a cold winter day one-third of the total output goes into space heating." His subject was electric domestic space heating and I still cannot believe that this is responsible for one-third of the peak at mid-day.

I see that Mr. Wilkinson's curves were made from estimates in 1946 (six years ago) and not from experimentally provided data. Much duff has flowed under the power station boilers since 1946.

My plea to release coal for export is solely to get money quickly. In the export trade the better the coal the more we can get for it. This can be done by making use of the power stations' ability to burn otherwise unsaleable fuel and for the time being some of the better slacks which can be exported, but have a low price value in the export market. With the increased machine mining the quantity of low grade fuel will increase as the N.C.B. has just pointed out and power stations will have to take more of this, so that even the proportion of better slacks they are at present allowed will decrease.

There must be a considerable time lag before enough of the new grates can be installed to have much effect on the coal position; in the meantime good coal which otherwise might be burned on inefficient grates can *only* be released for export by the wise use of electric heating. By the time more grates have been installed, power station efficiency will have improved and so we shall benefit all round.

I do not advocate that all domestic space heating should be done by electricity, but I do advocate freedom of choice of method because I feel that in our present state we would be foolish not to make use of the wonderful flexibility of use, cleanliness and labour saving which electricity brings.

R. E. Gamlen

BRIGHTON

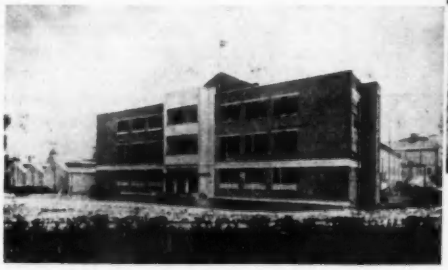
THE E.L.M.A. REPORT

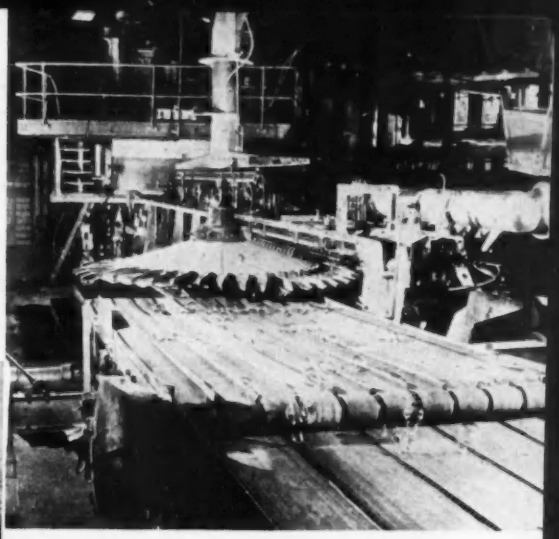
THE Government attitude towards the findings of the Monopolies Commission, in their report on the supply of electric lamps, was given last Monday in a written answer to a question by Mr. Lewis, M.P. Mr. Sandys, Minister of Supply, stated that the Government were in agreement with the majority of the recommendations. These were that (i) members of E.L.M.A. should sell lamp components—other than patented items—to members and non-members at the same price; (ii) that if a new patent policy should result in reduced competition to E.L.M.A., the question be examined anew; (iii) that the controlled companies should not be used as fighting companies; (iv) that the sales quota system be ended; (v) that restrictions be removed on Type "B" lamps. (vi) that arrangements for exclusive dealings and aggregation of quantity rebates be ended; (vii) that payments to associations of distributors be ended; (viii) that the enforcement of resale price maintenance by sanctions of fines and the Stop List be ended, and (ix) that the rules be altered to permit other distributors as well as co-operative societies to give "dividends."

With regard to no. (vi) the Government proposed for the present to reserve judgment on the recommendation that aggregated rebates should be abolished. Regard had been had, in adopting this course, to the Commission's view that the practice of fixing common manufacturers' selling prices, with which the system of aggregated rebates was associated, facilitated interchange of technical information. It was also possible that the smaller manufacturers might be adversely affected.

The position had been fully discussed with E.L.M.A. and they had given assurances that they were taking action to bring their arrangements in line with the Government's conclusions.

1,500,000 Lamp Bulbs —*per day*





Continuous Flow production applied at new Harworth plant

THE increasing demand, both from home and overseas markets, for electric lamps and valves has stimulated the designer of automatic glass-blowing machines toward units with a phenomenally high output. The British Thomson-Houston Co. and The General Electric Co. have joined together to form a new company, Glass Bulbs Ltd., which is operating these machines at a new factory at Harworth, near Doncaster. The output of this factory is as high as one and a half million glass bulbs per day. Production of all the bulbs required for Mazda and Osram general lighting service lamps is being concentrated at this factory, and, in addition to this, the output is sufficient to meet the requirements of all other lamp makers in the British Isles, and yet allow an ample margin for export to Europe and the Commonwealth. This enormous output is achieved on two ribbon-type machines—the only ones of their kind outside the United States.

Raw Material Handling

The location of the factory was determined to afford the special facilities required. Female labour is available in nearby villages; ample supplies of coke oven gas for firing the furnace can be obtained from the nearby Harworth Colliery and rail facilities for delivery of raw material and shipment of the finished products are in existence.

(Above) The works of Glass Bulbs Ltd., at Harworth, nr. Doncaster. (Right) Finished bulbs being discharged from the turntable on to the conveyor

The plant itself comprises the main factory building housing the furnace, ribbon machines, annealing lehr, inspection point, packaging lines, chemical laboratory, stores, workshop and main offices. At one end is a 100 ft tower where the raw materials are taken in. This tower consists essentially of seven silos, extending from top to bottom, each one of which is capable of holding 1,500 tons. Raw materials are soda ash, dolomite, limestone, sand and felspar in addition to "cullet" or surplus glass which is fed to its silo by a mechanical bucket conveyor inside the building. All these materials are available in this country.

These materials are reclaimed mechanically from shelves at the top of their respective silos and pass down chutes to the automatic weighing machines, two floors below, whence they are discharged in their correct proportions into a rotary mixing drum. Remote control panels give an accurate and instantaneous picture of the course of events, and a small staff of two men suffices to supervise the working of this important section.

Furnace Operation

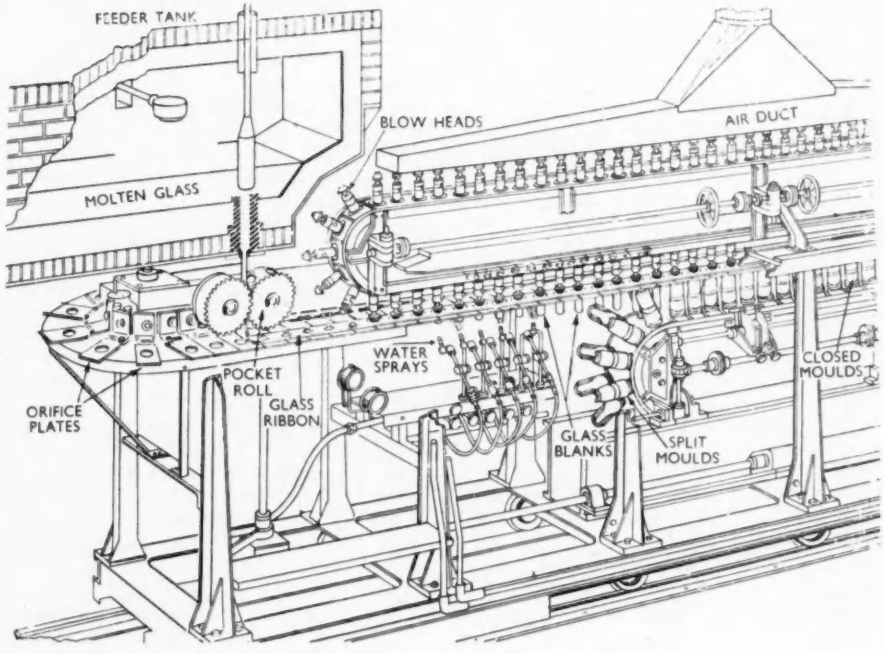
From the mixing drum, the thoroughly blended materials are automatically discharged into canisters which are mechanically conveyed on a roller runway to the hopper from which the furnace is fed. Mobile screw feeders force the charge, or batch, from the hopper outlets into the mouth of the furnace.

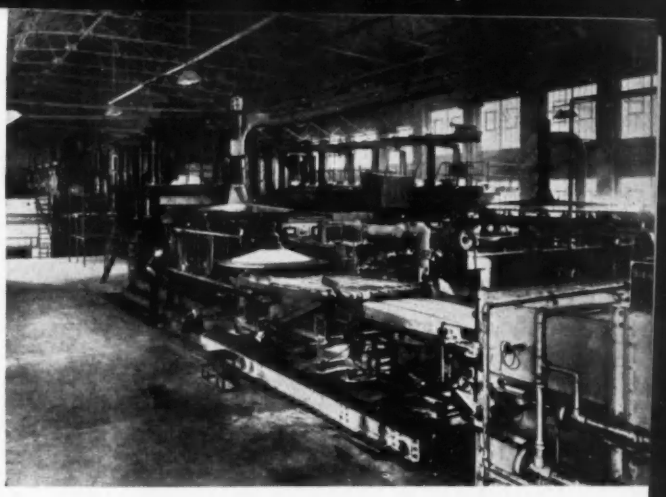
About 150 tons of glass a day can be produced by the continuous tank type, cross-fired regenerative furnace. Temperatures are suit-

The forehearth is shown in this view with the ribbon machine in the middle distance

ably graded through the melting and refining ends, the glass finally passing through the forehearths, which are of the most modern automatic type, and which bring the glass to the exact temperature for feeding the ribbon machines. The pressure in the furnace is maintained automatically at slightly above atmosphere, and again, remote recording and metering instruments are used, grouped on panels in the machine room. In the event of the gas supplies failing, the furnace can be oil-fired from emergency storage tanks.

On leaving the forehearth, the glass, at the correct temperature flows in a controlled stream between two rotating water-cooled rollers located at one end of the ribbon machine. These rollers are somewhat different in appearance: one has a plain surface, while the other contains "pockets" or circular depressions. The glass, therefore, issues from them as a continuous ribbon bearing a series of protuberances or "humps" caused by the depressions in one of the rollers. After leaving this section of the machine the ribbon is carried on a continuous belt of orifice plates, each of which is pierced with a circular hole which is accurately aligned beneath each "hump." As the belt moves forward, the ribbon now meets a continuous chain of blowheads which descend on to it from above, each blowhead pressing into the centre of each hump directly over the hole in the orifice plate. A puff of compressed air from the blowhead causes the hump to be extruded downward through the hole in the orifice plate. It must be recalled that the glass is in a semi-molten state throughout this process. The function of the hole in the plate is to determine the diameter of the flare





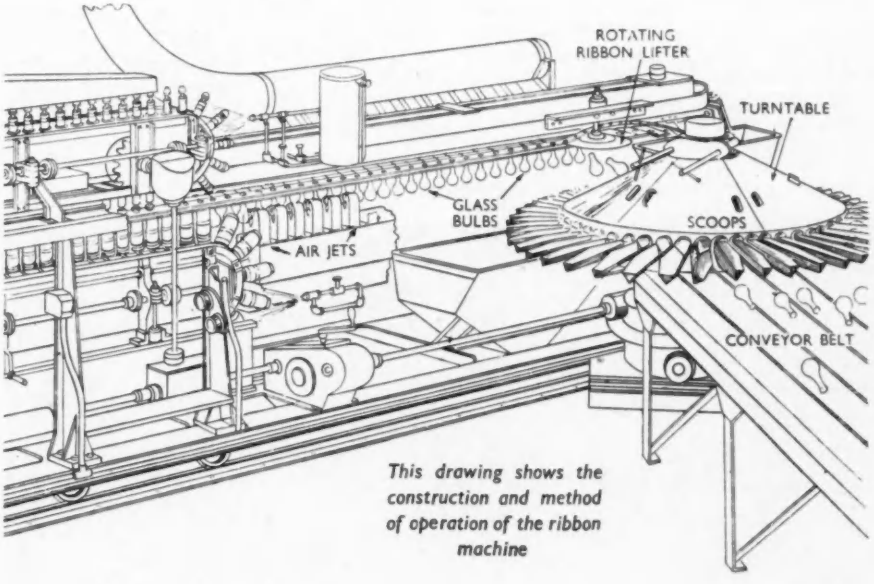
The furnace in the background, the ribbon machine and the entry to the annealing oven

at the top of the neck of the finished bulb.

We then have, hanging below the rapidly moving ribbon, a series of embryonic bulbs, or glass blanks, which depend further in depth until they meet the split moulds which rise from below on a continuous belt and close round them from both sides. The moulds now begin to rotate and meanwhile the air pressure from the blowheads increases so that the glass blanks are moulded to their final shape. During this operation the ribbon, blowheads and moulds are all moving forward together at the same speed. On completion of this process the moulds open, revealing the bulbs, and return on their belt under the machine. At the same time the blowheads break contact with the glass ribbon and return along the machine on the upper side of their chain. The orifice plates, carrying the ribbon with the blown bulbs depending from beneath it, continue to travel forwards while jets of cooling air play upon the completed bulbs. On reaching the rotating ribbon lifter the bulbs are successively tapped off by the strokes of a synchronised hammer and fall into the scoops of a rotary turntable which tips them on to a moving belt for conveyance through a gas-fired lehr.

The glass ribbon passes down to the floor below where it is water-cooled and subsequently broken up for re-use as cullet, while the orifice plates return horizontally behind the machine.

While it is obviously not possible to describe these intricate machines in detail, a few further facts may also prove of interest. In this connection the line drawing below gives a good idea of the operating principles involved.



This drawing shows the construction and method of operation of the ribbon machine

The moulding of the bulbs is essentially a very delicate and precise operation and for this reason the moulds are cork lined. The heat of the glass transforms the cork into fine carbon which readily absorbs water from the cooling sprays that play on the moulds as they pass back under the machine. Coming into contact with the hot glass, the water is vaporised, so that the bulbs are formed in a cushion of steam which leaves them with a polished finish.

The two ribbon machines are of different sizes : the larger one has a pitch of 3·9 ins. from centre to centre of the orifice plates, the smaller a pitch of 3 ins. The pitch dimension naturally determines the size of bulb which can be blown. There are in all, seven different sizes of orifice plate, and rollers of two different depths of pocket : $\frac{7}{32}$ in. and $\frac{9}{32}$ in. respectively. These adequately cover all the sizes of bulbs and valve envelopes produced.

An important characteristic of the ribbon machine is that it is much more versatile than any other bulb blowing machine. It will blow the miniature type of valve bulb at a very high speed and can be quickly turned over to the production of large size filament lamp bulbs. A further important feature is the consistency of the product and its constant dimensional accuracy which greatly exceeds that previously obtainable from any other machine.

Each ribbon machine is driven by a 10 h.p. compound wound d.c. motor supplied from a three-phase full-wave rectifier and operated under electronic control so arranged as to maintain constant speed at any setting within $\pm\frac{1}{2}$ of 1 per cent. for a 10% variation in voltage. This enables the motor speed to be varied from a crawl to 1,750 r.p.m.

The output of the 3-in. machine, which runs continuously throughout the 24 hours, is approximately 1,000,000 bulbs daily.

After annealing, the bulbs are air cooled while proceeding on a conveyor belt to the packers. At the control point five bulbs are picked off the belt every 12 minutes for examination and dimensional checks, continuous inspection being carried out on a quality control basis.

Packing and Storing

The packing of bulbs into cartons, labelling and sealing down take place on two floors of the main factory building, whence the cartons pass on conveyors to the finished bulb store. This building is 700 ft long by 110 ft wide; a railway line enters at one end and extends down one side for the full length of the store.

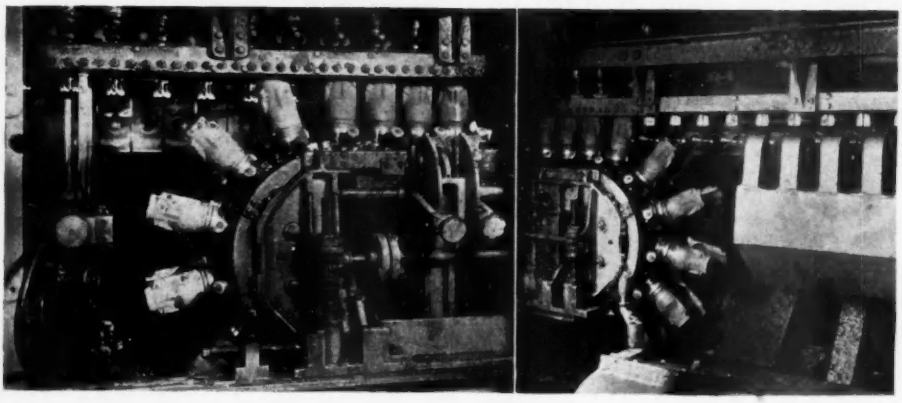
Inside the store, cartons ready for despatch are stacked on palletts and can be easily picked up and transported by means of battery-driven fork trucks. Between 20 and 30 wagon loads of bulbs are despatched from the works by rail every day.

Power Supplies

Electric power for the works is supplied from a transformer substation on the factory site. All the equipment is operated by a.c. motors with the exception of the ribbon machines which are driven by d.c. machines for which a rectified d.c. supply is provided.

As the manufacture of bulbs is a continuous process, and any interruption would involve wasteful and costly delay, arrangements have been made to ensure continuity of supply, in the event of a power cut, by the installation of emergency diesel-alternator sets.

Glass blanks hanging from the ribbon meet and enter the moulds. (Right) Finished bulbs leave the moulds. Jets of cooling air are seen on the right



Lightning Protection in H.V. Stations

Analogue Computor is used for Investigations on 330 kV System

THE problem of lightning protection is considerably more important abroad than in this country where the isokeraunic level, or number of thunderstorm days per year, is comparatively low. Nevertheless, the damage caused by lightning can be severe, and for this reason a study by Messrs. I. E. Gross, T. J. Bliss and J. K. Dillard published in the May issue of "Electrical Engineering" is of interest.

The system investigated was the 330 kV system of the American Gas and Electric Co., which is largely located in the region of Indiana, Ohio, West Virginia, Kentucky and Virginia. Here the isokeraunic level may be taken as 45 thunderstorm days per year, giving rise to an estimated 150 strokes per 100 miles of line per year.

Wave Analysis

In defining the magnitude and shapes of the incoming waves (it was assumed that the station itself and the lines themselves for a distance of a mile or so were adequately protected from direct strokes) various types of wave were considered. The first category was that resulting from strokes to the line shielding system of sufficient magnitude to flashover one or more insulator strings and so bring the phase conductor up to the tower top potential. Stroke currents of 180,000 amperes at least were required to cause a backflash, and, assuming this value, the potential across a typical insulator string was about 2,025 kV. The wave shape itself had a short tail. The other waves consisted of chopped waves produced by strokes directly to the phase wire of sufficient magnitude to flash over the insulation to the tower, and full waves caused by side flashes.

As both corona and resistive losses tended to slope off the incoming waves as they approached the switching station, two rates of rise were considered in order to bracket the range through which this quantity might reasonably vary, namely, 500 and 1,000 kV per microsecond.

The probabilities of these waves were computed as : short-tailed waves 0.0015 per year per mile of transmission line; chopped waves 0.00084 per year per mile of transmission line, and full waves 0.0015 per year per mile of transmission line.

Owing to the virtual impossibility of carrying out direct observation and measurement, the various station layouts were set up and studied for the various types of waves on an analogue computer. One phase of the 330 kV circuit between the generator transformer and the point where the transmission line entered the switching station, was set up, a number of pi-sections being used to represent the distributed constants. In the particular type of computor used, it was possible to insert an oscilloscope to measure the voltage between any desired points in the analogue circuits.

As the circuits represented included lightning arresters these were generally also simulated in the analogue, although several measurements were taken at random to determine the effect of removing the arrester from the circuit altogether.

Conclusions

A full analysis of the results was not included in the report of the study, but various conclusions were derived and submitted.

It was discovered that the surges are greatly modified in shape and considerably reduced in magnitude at various locations within the station due both to the distances involved and the tap leads to the main current-carrying conductor. The need for lightning arresters close to the transformers was clearly shown. Where no arrester was included the voltage magnitude is appreciably increased above the incoming surge at the station entrance. It was suggested that insulation levels could be reduced by taking advantage of the surge reduction created by tap-offs and other lines.

The final selection of basic impulse insulation levels for all equipment in a station must be made on many factors. These included (*a*) lightning protection level; (*b*) severity of surge voltage characteristics at the equipment; (*c*) probability of equipment failure with the protection scheme used; (*d*) frequency of damaging voltage occurrence; (*e*) cost of equipment repair as against the cost of protection; (*f*) disruptive effect on the electric system as a whole in the case of failure; (*g*) reduction of impulse strength of equipment with age, and (*h*) lightning arrester performance characteristics.

SAFETY IN INDUSTRY

INDUSTRIAL accidents and their avoidance were discussed by MR. H. R. PAYNE O.B.E., the chairman of the Industrial Safety Committee of RO.S.P.A., in a lecture delivered yesterday to the Royal Society of Arts. Right at the beginning of his address, he emphasised that the main burden of responsibility for avoiding accidents lay in the places of work where they occurred. Central authorities could help only indirectly.

Accident prevention could produce some dramatic reductions in injury rates, experience showing that as much as an 80% drop was possible, but this came only as a result of long and unremitting efforts. In a lengthy survey of the stages by which a safety programme could be established, the importance was stressed of giving proper safety training as part of the training for the job; not, as in most cases, special safety training.

There was great value in general rules and codes for safety, but only provided they left plenty of scope for initiative and adaptation by managers, designers and engineers. It was necessary to avoid rigidly detailed rules, except as guides to official Government regulations, and then they should be kept to a minimum.

National Conference

A somewhat wider range of subjects was covered at the National Industrial Safety Conference held at Scarborough last week. The opening address was given by Lord Llewellyn, president of RO.S.P.A., who commented specially on the place of the smaller firm in the accident prevention movement. He was convinced that it was firms having 250 employees or less who had much to gain from the interchange of ideas on accident prevention as it affected their own particular class of works, yet it was just such firms which tended to stay outside the society.

A.S.E.E. Widens Scope

AT the annual conference of the Association of Supervising Electrical Engineers, held in London last weekend, two decisions of the first importance were taken. It was decided to accept minor changes in the rules, so that the Association could accept those members of the industry who are covered by the I.E.E.'s definition of "electrical technician." There was, as a corollary to this move, a suggestion that the title of the Association should be altered, so as to indicate this added interest. A majority of members were, however, against such a change taking place, and the society is to continue under its well established name.

Chairman's Address

In his chairman's address to the conference, MR. W. F. PARKER M.I.E.E., gave the usual review of the Association's progress in the past year. He noted especially the publication of the Year Book, and of the Guide to the 12th edition of the I.E.E. Regulations, and the Electrical Exhibition organised by the Central Regional Council. Speaking personally, he felt that the exhibition would undoubtedly call for repetition on an even larger scale.

Referring to the further expansion of the Association to cater for the technician, Mr. Parker singled out the opportunity as an unparalleled chance of expanding numerically with the support of the I.E.E., while at the same time encouraging the education and training of this section of industry. He called on the membership to have sufficient foresight to grasp this opportunity.

Commenting on the tendency to group employees in salary scales irrespective of their competence and individual enterprise, he stated the policy of the Association in negotiating employment agreements, which is to secure minimum salaries augmented by negotiation on the basis of individual ability for the particular job. Speaking of productivity, Mr. Parker deplored the continued comparison of our production with that obtained in the U.S.A. Such comparisons were vitiated by various economic considerations. One aspect of increased productivity which did not receive the attention it deserved was the prevention of waste, both of materials and of manpower.

He saw as the solution to many of the problems of productivity that of personal relationship. It was necessary for all to do what they could to understand the outlook of his fellow men, and to try to adjust personal opinions to those which are most representative. This difficulty showed itself even in the councils of the Association itself.

Problems and Practice

IN ENGINEERING

Earth Leakage and Parallel Earthing

I HAVE had a wide and practical experience with earthing difficulties in rural areas, and as this is a matter of some interest, I put forward some of the difficulties and complications I have met with in actual practice.

One of the main causes of unsatisfactory "earth leakage trip" protection, is that the contractor does not plan the installation. The building is wired without any thought given to the earthing system, and it is not until the supply authority come to make "connection," that an earth leakage trip is insisted as necessary. It is then found that many parallel earth paths, hidden and unknown, have been created. This often leads to an earth fault in one building operating trips on neighbouring installations.

It is not safe to fit earth leakage trips without solid parallel earthing, because no satisfactory system of periodic maintenance is in operation. It is possible to compensate for any parallel earth current even if a sensitive relay is necessary to boost the current operating the circuit-breaker. Careful attention is necessary when deciding the position of the relay earth-electrode.

It is surprising how earth fault current can circulate. At one cottage having no piped water or possible earthing point inside the house, a new t.r.s. installation had been completed, and the cooker circuit was wired with an earth leakage trip. The electrode for this was placed outside the front of the house, in the street, and near a gas main from the small local gas works. An earth wire was taken also, direct from the cooker, to an earth rod in the back yard, near a well. The supply main was h.s.o.s. cable from an overhead line, to plastic cut-outs. Before the installation was connected to any supply, the meter fixer having been in the house only a minute, he heard the trip coil making periodic buzzing noises. This took place at intervals, and when the breaker was closed, it eventually tripped out. The lady living in the house said she had frequently heard the buzzing before the mains service was installed (the house was wired first). Fault current was coming along the gas main and taking a parallel path through the earth rod "A", the trip coil, and the direct earth wire from the cooker to the rod "B" in the soil near the well at the back of the house, The earth leakage trip was the "relay" type. I doubt if the "direct" solenoid would have operated.

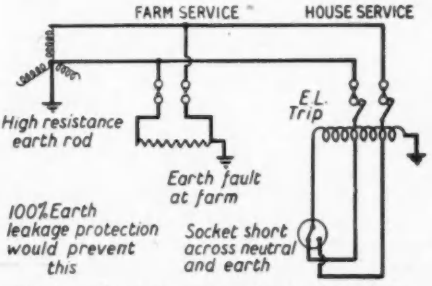
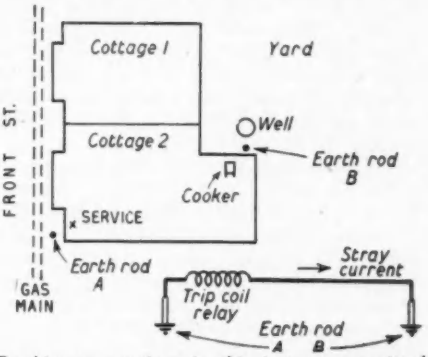


Diagram of earthing connections in the "alarm clock" case described in the notes above



Earthing connections in this instance permitted strong currents to take a path through a trip coil

At a house in another village the earth leakage trip acted for a time as an alarm clock, going off with a clang every morning at 6 a.m. to wake the people up and get them out of bed to see what was the matter. One of the sockets had a short between the neutral and earth, but of course, while this remained neutral no current passed. At the stated time every morning the farmer, at a neighbouring farm, switched on an appliance causing a temporary earth fault of lower resistance than the substation earth plate and the neutral became at potential to open the e.l. circuit-breaker in the house.

If a number of houses fitted with immersion heaters are "piped" for water from one main,

the earthing becomes solid to them all. This means that a fault on one can bring out the trips at all the houses. This can be prevented by fixing an insulated washer between two flanges at the main intake.

If the supply authority cannot get the sub-station earth down to a very low resistance, and they know the possibilities, it is far better not to waste money trying, that is if the village is fed with overhead line. Earth leakage protection for the whole village should be specified, leaving the high-resistance earth at the sub-station. Either way the cost is on the consumer. In bad ground even an extensive water main will be found to have a high earth resistance.

By Regulation 1006, twelfth edition, it is more necessary to measure the current flowing to earth than resistance. The installation inspector should be provided with means of measuring earth currents, and also the current in a relay circuit with any parallel earth. A voltage of 50 at supply frequency would be satisfactory.

The weakest part of the earth leakage trip is the test button. The contacts can cause a break in the earth circuit (open contacts), and the test is useless, as it is often found a switch will operate with the button. But the full 230 volts flashed over at an earthed point does not either operate the circuit breaker (or blow a fuse) due to parallel earthing shorting out the trip coil.

The only test should be the necessary voltage to earth applied at the appliance or machine requiring protection. Regulation 1006, Note 4—(V), and the earth leakage trip would be more efficient for the removal of the test button. —*Norman Green.*

Gas Pipe Shocks

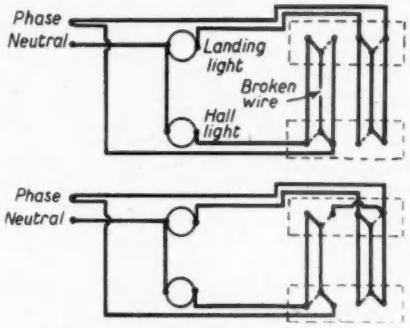
I WAS sent to investigate the complaint that a consumer "whilst spring-cleaning, received a shock from the gas pipe." I noticed that the house was wired with v.i.r. in slip conduit, which was not earthed. On testing between the live side of the upstairs circuit and the gas pipe there was a reading of 50,000 ohms —all other circuits were infinity.

Checking the upstairs circuits the following fault was discovered. Removing the two-way switch and block of the staircase light, I found that the wood screw which had held the block had "drilled" the insulation of one of the strappers and was holding it tight against the slip tube. The screw was also touching the conduit. From observation it was apparent that the gas pipe and slip tube were touching at a point between the meter cupboard and landing. The fact that the two-way switch had to be in the fault position before the gas pipe became alive was a possible reason why shocks had not been felt earlier.

Examination of the screw and cable indicated a fault of long standing, as the screw was rusty and the cable covering was rusty looking at point of contact with each other.—*J. T. Wales.*

Decoration Difficulty

I WAS recently called in at a small modern suburban house to see to a hall light which would not go on; the control being by two-way switching. After the routine test of holder, flex and switch actions and finding o.k., it was clear that the fault lay in the wiring. A bell test-set indicated a break in the common wire



Connections for two-way switching

of the strapping cables linking the two-way switches.

The switches were flush type, and inspection of the interior of the switch-box indicated that the 'strappers' had been wired in three-core cable. Adjacent to each switch in the same box was another two-way switch controlling the landing light above, and the upper two-way switches were also in a common switch-box. As both light points were on one circuit it was easy, with the aid of pencil and paper, to sketch the connections, as shown.

Since the walls had been recently decorated and the flooring was covered with fitted carpets, taking out the broken cable, which was obviously buried in the plaster, and replacing by a new one would have meant a major upheaval. From the diagram above it can be seen there is a phase wire at each box, thus by transposing the switch connections one of the strapping wires can be dispensed with. The new connections, shown in the sketch, permits both two-way controlled lights to work perfectly with the broken wire disconnected. —*M. Neidle.*

The Institution's Year

Technical and Educational Activities are Prominent in the Annual Report of the Council for 1951-52

A YEAR of growth without any outstanding new developments is recorded in the report of the Council of the I.E.E. for the year ended 31st March, 1952. This report, which was presented to the annual general meeting of the Institution, held in London last Thursday, recorded an increase in membership during the year of 695, giving a total at its end of 37,253, of whom 17,757 were corporate members.

The outstanding change in the structure of the Institution approved during the year, was the formation of a Federated Scottish Centre, providing for three sub-centres based on Edinburgh, Glasgow and Aberdeen-Dundee. This new constitution is to come into effect next October.

Technical Investigations

Technical committees, either convened by the Institution or on which the Institution is represented, were very active during the year. An example of this facet of the Institution's work is given by the Engineering Codes of Practice Committee, which prepares jointly with the B.S.I., codes relating to matters outside the sphere of the Council for Codes of Practice of Buildings. Work is stated to be proceeding on codes for earthing overhead electric power lines, street lighting, general aspects of radio interference suppression, and safety lighting in cinemas. The work of the o.h. line code committee is stated to be under consideration by the Minister of Fuel and Power as the basis for a revision of El. C.53, the Overhead Line Regulations.

An investigation which the Institution shares with several other professional bodies is that into basic design temperatures for space heating installations. This is being undertaken by a study committee set up at the invitation of the Minister of Works. It is stated in the report that a working sub-committee has carried to an advanced stage the examination of factors governing the choice of such temperatures, and that it hopes to present its report shortly.

During the year the Council of the Institution supported the proposal that the British Standards Institution should establish separate Telecommunications Industry Standards Committee, and made nominations for Institution representation on such a committee. It is understood that some committees of the Electrical Industry Standards Committee will be transferred eventually to the aegis of the new body.

I.E.C. Representation

As a consequence of changes in B.S.I. organisation, some alteration has become necessary in the practice whereby the Electrical Industry Standards Committee of the B.S.I. acted as the British National Committee of the International Electrotechnical Commission. Accordingly, the Council has made nominations for representatives on a separately constituted British National Committee.

The report records the Council's disagreement with the proposals made in last September's White Paper on Higher Technological Education. In the Council's opinion the universities and the technical colleges have complementary, though separate, functions to fill in helping to meet the deficiences in technological manpower, and they favour the general solution put forward in the Percy Report, which involves the development of a small number of technical colleges as "Royal Colleges of Technology."

Science Museum

In connection with another branch of educational activity, it is noted that the bulk of the Institution's Museum has been dispersed, only a few items being retained as souvenirs of great electrical personalities. The Council has in another connection, approved the proposals of its Committee on Electrical Exhibitions for a new and enlarged electrical power collection at the Science museum. The Council have further authorised the committee to appeal for funds for the collection to various interested bodies, and have agreed that the Institution should hold any moneys until they are dispersed. The appeal makes it clear that gifts in kind of apparatus and equipment would be equally welcome.

Diesels for Power Generation

NEW RANGE OFFERS SPECIAL ADVANTAGES FOR ELECTRICAL APPLICATIONS

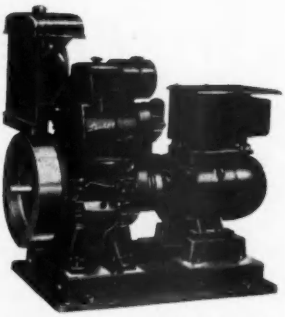
SPECIAL suitability for electric power generation applications is a feature of a new range of diesel engines which have been developed by the Gloucestershire firm of R. A. Lister and Co. Ltd. Known as the Freedom range, these engines are designed to run at 1,500 to 1,800 r.p.m. with close-speed governing, and can thus be directly coupled to alternators for 50 or 60 c/s working. At present the range is available in 1, 2, 3, 4 and 6 cylinder sizes, with a rating of 9 h.p. per cylinder at 1,800 r.p.m.

We were privileged last week to visit the factory at Dursley where this range of engines is being made, and to inspect the new special-purpose production line which has been laid down for this purpose. A full description of the machines that this involves is impossible in this short article if the power unit itself is to be described, but it may be noted that production of the crankcase alone is carried out on a line of 33 special machines and three standard radial drillers, while for the crankshaft and camshaft further special production lines have been organised. A feature of this tooling is the use of the new unified screw thread in the engine.

Castings for the crankshaft are produced in the fully-mechanised foundry at Dursley, while gears are cut at the firm's factory at Stafford. Sub-assemblies are produced at various other subsidiary factories, but the final assembly is performed on a continuous conveyor line at Dursley. This line leads directly to the test department, where each engine is run at full load for six hours. The dynamometers which take up the energy feed back into a d.c. main to which is connected a La Cour convertor. On the a.c. side this operates in parallel with the public supply.

Engine Features

In the design of the engine, the object has been to produce a completely reliable power unit that can be readily hand started. High-speed running while attaining these objectives has been secured by many novel design features,

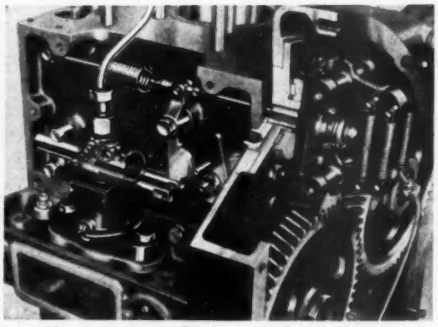


General view of the F.R.1 engine

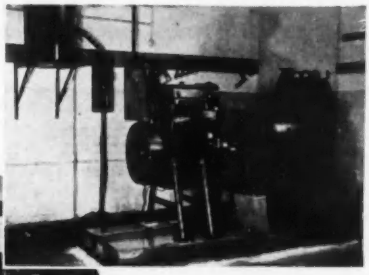
and it is noteworthy that at 1,500 r.p.m. the piston speed of the Freedom range is only 3% higher than that of a comparable engine running at 1,200 r.p.m. The achievement in respect of weight is exemplified in the general statement which can be verified by particular comparisons, that it has been possible to provide a given power with an engine weight down almost to a half of previous standards.

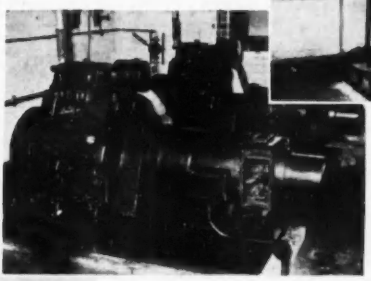
Because of the wide range of applications which are expected to be found for these engines, particular attention has been given to accessibility. Although all the working parts are enclosed, they can be readily reached via easily removed covers. Priority attention has been given to the possibility of wear of big ends, main bearings, pistons and cylinder linings. A standard type of wet-liner is used, chrome-hardened by the firm's patent process. Crankshafts are machined from 60/65-ton manganese molybdenum steel forgings, and are of ample dimensions to counteract the possible effects of the high running speeds.

All auxiliaries in the engine are driven from a train of gears mounted at one end. These are cut with helical teeth, with fine limits to ensure

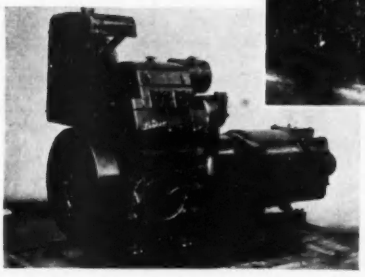


Close-up view of the centrifugal governor





In the photograph top right, an FR2 engine is seen on test driving a dynamometer at the Dursley works. Two such engines are shown in the centre illustration, driving 9 kW alternators that are paralleled for supply purposes. A close-up view of this 8½ h.p. two-cylinder diesel engine is seen in the final illustration, below, with a 10 kVA alternator connected. Here it is provided with radiator cooling, while tank cooling is used for the application in the centre illustration



minimum backlash and to keep down noise. Of special importance from the electrical aspect amongst these gear-driven auxiliaries is the governor. Its general construction is apparent from the illustration, and it is notable that the "settled" variation of speed is limited by this device to ±2%, with momentary speed variations not exceeding ±4%.

Although the suitability of the engine for hand starting has been stressed, automatic starting is readily provided, the starting motor pinion meshing with a gear cut at the engine-end of the flywheel.

Electrical Applications

The special features which make this range of engines particularly suitable for electric power generation have already been mentioned. Lister's themselves are building the engine as a generating set with standard ratings of 4½, 8½, 14, 19 and 29 kW at 0·8 p.f., 50 c/s, with a tank-fed cooling system.

In the case of the two smaller sets, the alternator is a single-phase machine, and voltage regulation is obtained by means of a carbon-pile type regulator mounted directly above the generator casing. External wiring is kept to a minimum. A hand-regulator and a change-over switch is also provided. Quoted price for sets of this style, without electric starting gear, are £494 10s. for the 4½ kW design, ranging up to £1,060 10s. for the 29 kW unit. In the case of the last three sizes, a three-phase self-compensated type of alternator is employed: in the examples which we saw, these were manufactured by Messrs. Maudsley.

Standard equipment has been designed to meet the usual types of control equipment that may be required. Separate panels are produced to house the separate controls, etc., and these can be built up into a single control hood. This facility covers remote control of the engine (in conjunction with electric starting, of course), metering of voltage and current and automatic protection against water temperature and oil pressure irregularities.

In course of development, the Freedom range of engines has been tested in both arctic and tropical conditions, while user experience on prototype models has demonstrated that the claims advanced are not exaggerated.

Marketing

It is understood that at present some 400 engines/week are being produced. Production is principally limited by the availability of materials and of labour, and it is estimated that the re-tooled machine shops are capable of turning out 1,000 engines/week over the full range of ratings.

At present the concentration is on exporting the engines in support of national needs and government policy, and on supplying them for incorporation in machines of other manufacturers which are to be exported. To ensure that full attention is available for overseas customers, personnel from the company's overseas organisation have been attending special instruction courses at Dursley during the past twelve months, and stocks of spares have been built up in all markets, although the Freedom engines themselves have in some cases yet to be introduced.

overseas news

Progress in Tasmania

In addition to keeping rationing at the same level, and maintain supplies to bulk consumers, the Hydro-Electric Commission of Tasmania has connected a further 6,630 consumers in all parts of the State during the past year without overloading the power system, Mr. Cosgrove, the State Premier, announced recently. During the past nine months the Commission generated 776·9 million units, an increase of 2½%. This was largely due to the installation of the power station at Butler's Gorge, which has operated satisfactorily since last October. Satisfactory progress was being made at Trevallyn; tunnel construction there was not up to schedule, but faster progress was expected in the future. It was hoped to have the first unit of the Tungatinah generating plant operating by the winter of 1953, he added.

Charges up in Brisbane

A 21% increase of electricity tariffs of the Brisbane City Council and the City Electric Light Co., Ltd. (also of Brisbane) has been approved by the State Electricity Commissioner of Queensland, Mr. H. Neil Smith. For the city council's electricity department this will mean an extra £300,000 revenue in 1952-53. Mr. Smith estimated that electricity charges in the area had increased by 85% since 1947.

Pine Falls Target

The Pine Falls power plant should be completed by August, just three years and three months after work was commenced on the project, Mr. D. M. Stephens, chairman of the Manitoba Hydro-Electric Board, has announced. On completion, the station will have six 19,000 h.p. generators installed. Construction of the station began in May, 1949, and the first two sets started operating last December.

A Plan for Farmers

The Farmers' Union of Alberta has now put forward a plan for rural electrification in that Province. It advocates that the task should be the responsibility only of the Alberta Power Commission, who should take over the power companies and lines with the exception of municipally-owned plant. The Union recommends that lines be extended without cost to the farmer, and where payment for lines has already been made it should be refunded. Under the existing system in Alberta the farmer is required to pay the cost of the rural lines, and the power companies have been responsible for connecting many of the 11,000 farms already supplied.

Traction at 3,000 V d.c.

After consideration of the merits of the 20 kV 50 cycle system, the Belgian National Railways has decided to proceed with its already declared project to electrify at 3,000 V d.c. approximately 1,500 kilometres of line—about 30% of the total length which is now carrying 70% of the traffic. As a result of the investigation, it was considered that the higher cost of the 3,000 V system would be outweighed by the expense of eventually converting to 20 kV the existing 3 kV lines. These latter are the Brussels Nord-Antwerp Central; Lunkebeck-Antwerp North; and Brussels Midi-Charleroi Sud lines. As a further reason for the decision, it is stated that the plans to electrify at 3 kV had almost been completed.

Delhi Expansion

It is expected that the first of two 9,200 kW turbo-generators, with its associated boiler plant, will be put into operation by the Delhi State Electricity Board next month. A second similar plant, now under erection, should be ready in about three months' time.

State Take-Over

The Madhya Pradesh Electricity Board, which was constituted in March, 1951, assumed full control of the entire electricity development in the State from last month, we learn. The State Government has sanctioned a loan of Rs. 1,66,79,000 to the Board during 1952-53 to finance the grid schemes now in progress. The Board has taken over responsibility for work on two power schemes—the 17,000 kW Chandini station, which should be operating by the end of this year, and that at Balharshah, near the Hyderabad frontier, which is to have an installed capacity of 22,000 kW and should be completed by 1954.

Develop with Controls?

A warning that electricity cuts on the Witwatersrand this year might be even worse than last year was given by Mr. J. C. Downey, electrical engineer of the Springs Municipality and president of the Association of Municipal Electricity Undertakings of Southern Africa, speaking at the association's annual convention at Bulawayo earlier this month. Increasing demands, the shortage of generating plant and an overloaded transport system were the factors that might bring about the heavier cuts, he said. In established undertakings the greatest rate of increased demand came from domestic consumers. On the Witwatersrand it was the water heater that sent the demand up in winter. He considered it was

not sound practice to regulate consumers' times of use by a planned campaign. No electricity undertaking should be allowed to develop as a planned, politically-controlled body without consideration to the economics of the development, he went on. A political plan to bring electricity to the country at low tariffs could mean that the slum dweller in the town would contribute to the cost of providing electricity to the country homes of the wealthy, he insisted.

Safety Measures Needed

At the same conference, following discussion of a paper by Mr. J. W. Swardt, principal engineering officer of the South African Bureau of Standards, delegates approved a motion that the Union Minister of Economic Affairs, Mr. van der Walt, be asked to consider the promulgation of electric safety specifications under the 1945 Standards Act. Mr. Swardt said an increasing number of countries were adopting effective measures to control the sale of unsafe or inferior electrical goods. In South Africa the matter had been discussed each year for the past few years, but so far no comprehensive set of compulsory safety specifications had been drawn up.

Mr. J. L. van der Walt, town electrical engineer, Krugersdorp, said in 1949 there occurred in South Africa 75 electrical accidents of which 32 were fatal. Of these deaths, 18 came from domestic appliances and 15 from electrical tools. In 1950 there were 60 electrical accidents. Of the deaths that year, 18 resulted from domestic appliances and 10 from electric tools. Other speakers gave examples of dangerous apparatus.

Expansion

Work is now well advanced at Queenstown, Cape Province, on the town council's new power plant extensions which are planned to be operating for the peak load next winter. Two additional boilers and a 3,000 kW turbo-alternator are being installed. This project is the first in the town council's 15-year power policy which will lead up to the construction of a new power station in 1962. Last year the peak load was reached in July when a figure of just under 3,800 kW was recorded, Mr. V. E. O. Barratt, the electrical engineer, has pointed out, but it was expected that that total would be well exceeded this year.

Testing a Theory

The French Government has now authorised a loan of 200 million francs to a company known as "Energie des Mers" which was formed in 1948 with the object of investigating possibilities of harnessing sea water for the production of electricity. The company includes participation by the Caisse Centrale d'Outre-Mer, the Ivory Coast administration and Electricite de France, in addition to private investment. Studies over a period of ten years have, it is claimed, led to the conclusion that the marked differences of temperature between the sea at the surface and at certain depths may be used for creating a constant flow for turbo-generators. Earlier reference to this proposal was made in our December 27, 1951 issue. It is now proposed to put the theory to practical test at an experimental plant to be built at Port Boet near Abidjan, in French West Africa.

Loan for Project

The Egyptian Government last week decided to float a £E27½ million internal loan to cover the cost of completion of the Aswan Dam hydro-electric project. It is expected that a decision will be announced soon concerning the placing of the contract for the civil engineering side of the project; it has been reported that a tender from a British concern has been withdrawn. The latest target date for the completion of the hydro-electric station, for which the main power plant has been ordered, is now given as 1955.

Centralised Control

Auckland Electric Power Board, N.Z., has under consideration a plan to instal a centralised control system, to provide control of water heaters, street lighting, etc. The board's chairman, Mr. J. A. Steele, said recently that the system would cost about £450,000, but engineers were now preparing a report for consideration by the board. He pointed out that the need for some more effective control of load had forced them to seriously consider the proposal.

Alternatives Wanted

A further warning of the urgent necessity to investigate all possible alternative sources of power supply, since the economic water power of New Zealand will be fully exploited within 10 to 20 years, was made recently by Mr. M. G. Latta, chief electrical engineer to the N.Z. State Hydro-Electric Department. The alternatives he discussed were using coal or oil fuel steam stations, geothermal steam stations, atomic fuel—which, he remarked, seemed to be getting more uncertain than ever—and power brought across Cook Strait from the South Island. Geothermal steam or cables across Cook Strait would be better economically than coal, oil or atomic-fuelled stations, but it was impossible at present to say definitely that either geothermal steam or the marine cable could be developed, he stressed. Therefore, it was essential that extensive investigations be carried out without delay.

Fiji Plan Dropped

A plan to utilise the Navua River for power generation to supply electricity to Suva and southern Viti Levu has been turned down. Engineering and geological technicians who studied the proposal last year, have reported that the scheme would cost about £5 million, plus the cost of transmission lines and the distribution system. They considered that the proposed dam would not create a 48 sq. miles lake, but only about 3 sq. miles. Also, their borings down to 150 feet at the dam site had failed to reach bedrock, and as the annual interest, etc., charges are estimated at £290,000 with no possibility of being covered by revenue for at least 10 years, the Fiji Government has agreed with the Colonial Development Corporation (which was to pay a substantial part of the cost) not to proceed with the plan.

PERSONALITIES

IN THE INDUSTRY

S. O. Bowker, Ltd., announce the resignation of their **Mr. S. O. Bowker** as chairman and managing director, owing to ill health. Mr. Bowker, who has been with the company since its inception in 1930, is a familiar personality to many in the electrical accessory industry. Unfortunately he will not, in future, be able to take an active part in the business, but will still remain on the board of directors. His numerous friends will join us in wishing him a long and happy retirement.

Mr. S. O. Bowker

Mr. D. E. Brooks has been appointed an outside representative at the Liverpool branch of W. T. Henley's Telegraph Works Co., to assist Mr. S. Roy Gee, branch manager. Mr. Brooks joined Henley's head office in 1939 and has gained a wide experience of their products, particularly electrical distribution equipment.

Mr. R. A. Sibson, A.M.I.E.E., city electrical engineer at Bulawayo, was elected as the new president of the Association of Municipal Electricity Undertakings of Southern Africa, at the conference held at Bulawayo earlier this month. The new vice-president is **Mr. J. C. Fraser,** M.I.E.E., general manager of the Johannesburg Electricity Department.

Lord Cunliffe has been appointed an additional director of the Brush Electrical Engineering Co.

Mr. John Oldham, O.B.E., J.P., chairman of Oldham and Son Ltd., sailed in the *Queen Elizabeth* last week for the United States, to visit his firm's associates there. He will be away about a month.

Formerly deputy superintendent at York power station **Mr. F. A. S. Walker,** A.M.I.E.E., A.M.Inst.F., has been appointed station superintendent at Greenhill (Oldham) power station, North Western Division of the B.E.A. In 1933, he was engaged as a demonstrator in the Department of Electrical Engineering at Loughborough College, and was later a test engineer with the B.T.H. Co., and Newton Bros. (Derby) Ltd. He also served in various capacities with several electricity undertakings, and from 1946 to 1949 was charge engineer at Scalcoats power station in the Yorkshire Division.

Three new appointments at district offices have been made by the Metropolitan-Vickers Electrical Co. **Mr. E. Mead,** B.Sc.(Eng.), M.I.E.E., is now assistant manager of the London office; **Mr. R. Allen,** Assoc.M.C.T., A.M.I.E.E., becomes assistant manager of the Birmingham office, and **Mr. T. Gill,** B.Sc., A.M.I.E.E., has been appointed manager of the Swansea sub-office. Mr. Mead gained early training at Brighton Technical College, and joined M.-V. as a college apprentice in 1925. From 1926 to 1933 he specialised in heavy switchgear, spending a short time with Manchester Electricity Department and also handling contracts for Russia and for the C.E.B. 132 kV south-west grid scheme. In 1933 he became manager of the Stoke-on-Trent sub-office, during which time he was chairman and treasurer of the N. Staffs branch of the Association of Mining, Electrical and Mechanical Engineers. In 1944 he was appointed to the firm's London office. Mr. Allen, who was educated at Manchester Grammar School, joined M.-V. (then British Westinghouse) in 1916 as a trade apprentice, and in 1921 went into the Motor Engineering Department. Five years later he transferred to General Engineering Department, dealing with industrial electrification schemes. In 1927 he moved to the M.-V. Birmingham office as senior plant sales engineer. He is treasurer of the Warwick and S. Staffs branch of the A.M.E.M.E., a member of the E.P.E.A., and also of the Birmingham Electric Club. Mr. Gill was educated at Burnley Grammar School and Manchester University, and went to M.-V. in 1925 as a college apprentice, afterwards entering the Motor Sales Department. He transferred to the Glasgow office in 1930, and two years later moved to Cardiff office. He is a past-president of the S. Wales branch of the A.M.E.M.E.

Mr. E. Mead

Mr. R. Allen

Mr. T. Gill

A few days ago saw the retirement of **Mr. S. A. Russell**, A.M.I.E.E., senior assistant engineer (electrical), No. 3 sub-division of the North Western Division of the B.E.A., after completing 49 years service in the Supply Industry. He started with the Manchester Corporation undertaking in 1903, and after spending some time at Ashton-under-Lyne and Leicester, returned to Manchester in 1917 as engineer-in-charge, city stations. He later became turbine-house superintendent at Stuart Street, before transferring to Barton as acting assistant resident engineer, in which capacity he played a large part in commissioning that station. Subsequently, for a period in 1929 he was station superintendent at the then new Portishead power station, Bristol, returning to Manchester in October, 1929, as resident engineer at Barton power station. In 1930 he became generation engineer to the Manchester Corporation Electricity Department, holding that position till vesting day, when he was appointed executive officer for the Manchester stations of the B.E.A., and in 1949 he received the appointment from which he has just retired. Between 1945 and 1947 Mr. Russell was also seconded to serve on the Allied Control Commission in Germany as electrical engineer of the British Sector in Berlin and later as electrical engineer to the British zone.

Mr. I. Sellars, a representative of Ekco-Ensign Electric Ltd., has been returned as Conservative councillor for the Borough of Chorley, Lancs. Mr. Sellars, who is 26, is the youngest councillor that Chorley has returned for over 50 years.

Members of E. K. Cole, Ltd., heating staff with some of the area engineers from all parts of the country were at Southend last week for the annual Thermovent conference, at which the results of the past season's activities were studied. The accompanying photograph, taken during one of the intervals, shows, left to right, Messrs. **J. Clegg** (Scottish Area); **R. V. Ripley** (development); **P. Roebuck** (Lancashire); **W. P. Lawson** (design and estimating); **R. P. Johnson** (sales); **C. B. Cleland** (sales manager); **G. R. Wibrow** (Southern Area) and **J. C. Longman** (Eastern Counties.)

A group at Ekco's Thermovent conference

To fill the position of station superintendent at Earley generating station, vacated by Mr. C. J. Stockell who now occupies a similar post at Poole power station, the Southern Division of the B.E.A. has promoted **Mr. R. G. Henbest**, A.M.I.E.E., A.M.Inst.F., previously the deputy superintendent at Earley. Before going to Earley in November, 1950, Mr. Henbest had been station superintendent at Cowes, I.O.W., for five years. Educated at Bridge Boys' School, Harrow, and Acton Technical College, he served an apprenticeship with the General Electric Co. before spending periods with Kodak, Ltd., and the North Eastern Electric Supply Co. Subsequently joining the Edmundsons group, he successively acted as charge engineer, maintenance engineer and station superintendent at Cambridge, before going to Cowes in 1945.

Mr. R. G. Henbest

Mr. F. N. Beaumont, B.Sc.(Eng.), M.I.Mech.E., M.I.E.E., Mem.A.I.E.E., has been appointed engineer-in-charge of the Utilities Group of the Anglo-Iranian Oil Co. Ltd., London. Mr. Beaumont joined the Anglo-Iranian Oil Co. Ltd. in 1947 and became chief electrical engineer in 1949. During this period he has been responsible for the electrification of many refineries and associated plant, not only in the U.K. but also on the Continent of Europe and in the Middle East, and has initiated many new designs of electrical equipment for the Oil Industry, including remote-controlled flameproof starter equipment for electric motors. He will be succeeded, on the electrical engineering side, by **Mr. C. F. Mares**, A.M.I.E.E., who has acted as deputy and technical development engineer for the last three years.

Mr. H. C. Widlake, A.M.I.E.E., A.M.I.Mech.E., mechanical and electrical engineer, Coxside (Plymouth) station of the South Western Gas Board, has retired after 40 years' service with that undertaking. His retirement is quite nominal, however, for he has become staff engineer with a Plymouth timber firm, he tells us. Before entering the gas industry in 1912, he spent six years at the Prince Rock power station of the Plymouth Corporation Electricity Department, and in his apprentice days he was associated with the experimental stages of the Raworth traction system, one of the early ventures which led to the present-day regenerative control for electric railways. He was chairman of the south western sub-centre of the I.E.E. in 1946.

Now on a six weeks' visit to this country is **Prof. V. L. Narayanan**, principal of Birla College of Engineering, Pilani, India. His programme of study here, arranged by the British Council, includes the training of engineers for industry, apprenticeship schemes and laboratory gear. Prof. Narayanan was appointed by G. D. Birla to found the College at Pilani in 1946. In addition to being its principal he is professor at the College of Engineering, Madras; regional inspector of technical training; Dean of the Faculty of Engineering at Rajputana university; and a member of the India Council of Technical Education. Today, May 22, he is at Sheffield, tomorrow he will go out to Manchester, and in the next few weeks will visit Glasgow, Leeds, Cambridge and back to London prior to returning to India.

Whitehouse Industries Ltd. (Philidas Division) announce the appointment of **Mr. Gordon E. West** as sales manager for London and the Home Counties. He will be operating for the time being from his home address at Mansard Cottage, West Farm Avenue, Ashtead, Surrey.

Mr. John H. Jupe, A.M.I.E.E., has resigned from his post as press officer to the General Electric Co., Ltd. to take up an appointment in the Technical Information Division of Marconi's Wireless Telegraph Co., Ltd. at Chelmsford.

Forty years service with Phoenix Telephone and Electric Works Ltd., by **Mr. E. L. M. van Gelder**, general manager and a director of the company, was commemorated on Monday last at a dinner at the Trocadero, W.1., which was attended by many other long serving employees, and heads of departments. Tributes to the valiant work of Mr. van Gelder were paid by **Mr. E. N. Epstein**, managing director, and three other speakers, and he was presented with a television set to mark the occasion by **Mrs. O. Epstein**, a director. Mr. van Gelder, by the way, who suitably replied, is also in his second year of office as president of the London Association of Engineers.

The E.A.W. Diploma in Electrical Housecraft has been awarded to:—**Miss M. T. Cooke** of Reading (Southern Electricity Board); **Mrs. Y. Curtis** of Croydon (South Eastern Electricity Board); **Miss W. E. Ward** of Barnet (Eastern Electricity Board); **Miss B. O. Baker** of Willesden (London Electricity Board); and **Miss H. Faulkner** of Stockport (North Western Electricity Board).

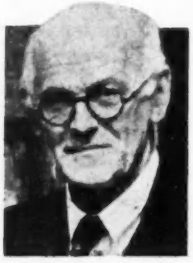
OBITUARY

Mr. W. Dickinson, district engineer at Bury to the North Western Electricity Board, died on April 23, aged 60. He had spent some time with the Yorkshire Electric Power Co., and Salford Corporation before joining the Bury undertaking in 1920. There, he was distribution superintendent before vesting day.

We regret to learn of the sudden death, on April 28, of **Mr. F. M. Burrell**, M.I.E.E., M.I.Mech.E., who was for long associated with the Jersey Electricity Co., retiring from the position of chief engineer and manager at the end of 1946. He had since continued as an active member of the board of directors. A native of Norfolk, he went to Jersey in 1924 as resident engineer for the Contracts Department of Crompton and Co., and under his supervision the original power station at Albert Pier was constructed and the mains in the parish of St. Helier were laid. He then became chief engineer and manager of the undertaking, which quickly thrived under his guidance. During that period Mr. Burrell frequently visited these shores and made numerous friends here. Prior to going to Jersey, he carried out several electrification schemes in India, notably at Allahabad and Lucknow, and, in the U.K., was associated with the development of electricity in Sevenoaks and Petersfield. Educated at Paston Grammar School and Leeds Engineering College, he served his apprenticeship with the Brush Electrical Engineering Co.

Mr. F. M. Burrell

Dr. W. Wilson, D.Sc., M.I.E.E., F.Inst.P., M.Amer.I.E.E., manager of the development laboratories at the Witton Works of the General Electric Co., died on May 16, aged 69. Born in Warwick, he was educated in New Zealand where his early experience included work on locomotive construction, as a marine engineer, and as chief engineer at Holt's Creek hydro-electric power house. In 1909 he became lecturer in electrical engineering at Auckland University College, and came to this country in 1915, joining the G.E.C. in the following year. At Witton he founded the Development Department for switch and control gear, which was later merged with the development laboratories. Dr. Wilson's name is primarily associated with switch, control and protective gear, for which he held about 60 patents. He was also the author of numerous textbooks and has done valuable work as chairman of various technical committees of the B.S.I., E.R.A. and B.E.A.M.A. He was a past chairman of the South Midland Centre of the I.E.E. and of the South Midland Radio group. His passing will be deeply regretted throughout the industry.



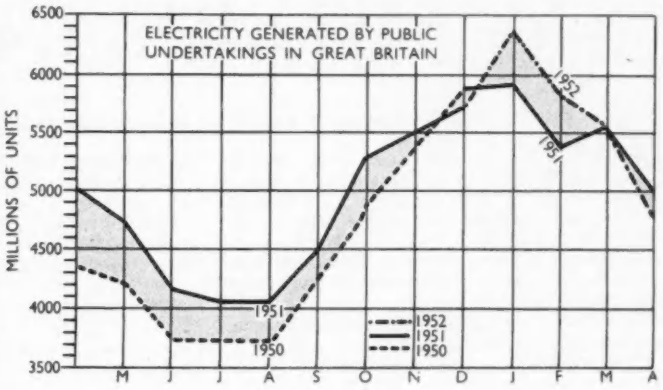
Dr. W. Wilson

UNITS GENERATED

4,813 million units was the total generated during April in stations under the control of the B.E.A., the North of Scotland H.E. Board, and the Lochaber Power Co. The corresponding figure last year was 5,015 million units, so there has been a decrease of 4·0% over the twelve months.

Of the total, 4,676 million units was generated in steam stations and 125 million units in hydro-electric.

Energy sent out during the month was 4,534 million units, 94·2% of that generated. This gives the total for the year so far as 21,242 million units, showing an increase of 2·8% on the first three months of last year.



POWER SUPPLY IN APRIL

FEATURE of last month's generation returns is the continued low value of units generated compared with previous years and expected rates of growth. In April generation by the B.E.A. at 4,692 m. units was well down on the 1951 figure of 4,900 m. units, though north of Scotland totals, with 121 m. units against 115 m., did not show this trend. The fact that the weather was, on average, some 3° F warmer accounts for some of the drop, but a basic fall in demand seems definitely indicated.

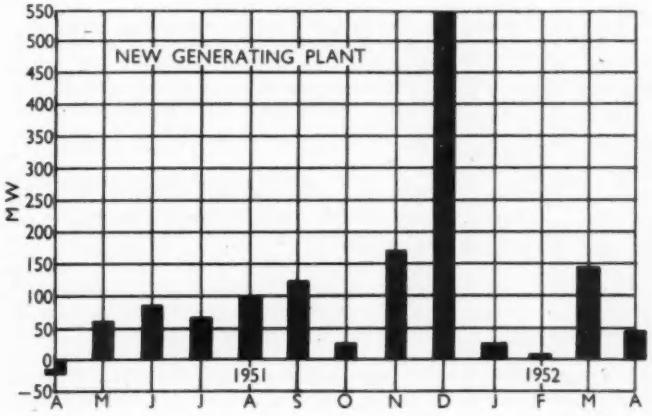
New Plant

The installation of new generating plant continued steadily at B.E.A. stations. In the London Division the third set was installed at Blackwall Point. Machines here are 30 MW English Electric designs working at 600 lb/sq in., 850° F, and this third set completes the first stage of the station.

Boilers

At Staythorpe (East Midlands Division) another 240 klb/hr Babcock and Wilcox boiler has been installed, the eighth since February 1950. Further north, at Skelton Grange (Leeds—Yorkshire Division) the fourth 360 klb/hr International Combustion boiler has been brought into operation.

Extensions at Blackburn (North Western Division) account for a 150 klb/hr Simon-Carves boiler appearing in the list. Five similar units are due here, together with two 40 MW English Electric turbo-alternators.



GENERATING PLANT

At the end of April, 1952, the installed capacity of the B.E.A. was 15,904 MW, showing an increase of 49 MW during the month. During this same period the North of Scotland total went down by 1 MW to 643 MW. The month's commissioning figures bring the overall increase during the past twelve months to 1,398 MW, or 9·2% of the April, 1951, total.

The total installed capacity used for the purposes of this graph should be distinguished from the output capacity. The installed capacity is the total m.c.r. of all the generating sets which are connected on both steam (if appropriate) and electric sides and are suitable for service.

The BUYER'S *Column*

Double-pole Simmerstat is Here!

A DOUBLE-POLE model of the "Simmerstat", made by SUNVIC CONTROLS LTD., 10 Essex Street, Strand, W.C.2, is now available. Although this has been specifically designed for the European market and meets Continental testing office requirements (it has been approved and is marked accordingly) it will prove of use wherever a double-pole Simmerstat is needed. In addition, it may be used as a single-pole control with the second-pole operating a pilot light circuit.

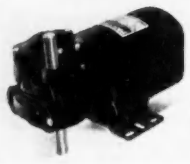
This Simmerstat is known as the Type TYCC. It is available for 100/125, 200/250 and 380 V. Terminal clamps and screws have metric threads and the knob is appropriately marked to meet European requirements. English standard knobs can be supplied if required.

This new model will be of particular interest to manufacturers of electric cookers both at home and abroad.

Double Reduction Worm Gear Units

AN excellent example of the range of f.h.p. motors, geared units, and control equipment which is produced at the Broom Road, Alderney, works of PARVALUX LTD., at Parkstone, Dorset, is the double reduction worm-gear unit which we have illustrated.

Made to B.S. specification these units make it possible to match r.p.m. to within the following limits any torque from infinity up to and including the figures set out in the left-hand column below.



lb./in.	r.p.m.
5	¼-22
10	¼-40
15	¼-60
20	1-50
25	2-40
30	3-35

Weight of the units is 5 lb and mounting is easy as the motor is suitable for running in any position. Alternative positions for the gear-box can be arranged to suit customer's requirements but standard types are as illustrated. The gears themselves are turned from bakelised fabric.

Ball bearings are fitted on the gear end of the motor whilst plain self-oiling, self-aligning types are fitted at commutator end.

The gear-box is fitted with self-oiling type bearings and a silver-steel shaft.

Finished in black crackle with plated fittings these units have series wound commutator type motors supplied for voltage ranges 100/110, 200/220, 230/250 a.c. or d.c. or universal.

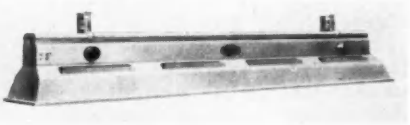
An Upward Trend in Fluroliers

A DISTINCTIVE feature first introduced in a vitreous enamel reflector by THE BENJAMIN ELECTRIC LTD., Brentwood Road, Tottenham, London N.17, in the Type "HH" twin 5 ft Flurolier released last year is now extended to the Types "FF" and "KK" for single 5 ft and 4 ft fluorescent tubes.

This feature consists of fins on the upward light slots to give a horizontal cut-off to the upward light. Further improvement in these fittings is an alteration to the number of upward light slots on each side of the reflectors. Types "FF" and "HH" will now have five slots per side, but the Type "KK" will remain at four slots per side.

In addition, the plastic windows for these slots as supplied for the Type "HH" will now be common to the Types "FF," "HH" and "KK."

Four light slots each side are features of the Flurolier Type "KK"



Control Panel Indicator Lamps

SUITABLE for all mains-voltage uses and in all types of apparatus and equipment and using normal easily obtained "Pygmy" B.C. lamps is a new large-size signal lamp fitting introduced by A. F. BULGIN AND CO. LTD., Bye Pass Road, Barking, Essex.

These signal lamp fittings have polished black Bakelite front bushes and screw-on bezels with non-ferrous metal body, crackle-black finish and Bakelite lampholder with shrouded terminals. The front moulding, however, can be supplied to quantity orders in any normally available coloured thermo-plastic.

Adequate ventilation louvres are provided so designed that the light traps, even when lamps are mounted side by side, will permit cross lighting of the lamp glasses giving false signals.

A full range of front coloured lenses is available, or alternatively plain glass lenses can be used with coloured pygmy lamps or neon indicator lamps. Fixing covers are concealed by lens-bezel.

Sizes 2·822 in. by 4$\frac{11}{32}$ in. (71·2 mmϕ by 119 mm). Front panel projection 1$\frac{15}{32}$ in. (37·3mm). List No. B650. Price (retail) 25s. without lamp.

A Cool Drink is Welcome

NOW being publicised by the FRIGIDAIRE division of GENERAL MOTORS LTD., Stag Lane, Kingsbury, London N.W.9, the model PHT-711 water cooler is a self-contained unit powered by a ½ h.p. twin cylinder reciprocating condensing unit.

Finished externally in bronze metal-base paint with black enamel plinth and white vitreous enamelled basin the frame constructed from formed steel angle is surrounded by a shell of furniture steel. Four removable panels are fitted.

The water tap is chromium-plated brass and is easy to operate under high water pressure. It includes an adjustment for regulating the water flow. As an optional extra a foot-operated water valve control is fitted. Storage tank capacity is 1·6 Imperial gallons. The tank is fitted with a special water separator for added cooling effect and connections are provided for draining the tank connecting a remote "bubbler" or tap or providing a remote faucet for filling glasses.

The model PHT-711 is powered by a Frigidaire high-capacity twin-cylinder condensing unit with air-cooled condenser and ½ h.p. motor. Capacitor start motors are normally fitted for a.c. supplies, whilst for d.c. a compound wound motor is provided.

The Preservation of Wood Poles

THE value of the treatment of wood poles against rot and wood decay is well known to most transmission and distribution engineers, and in fact the process has been described in these columns several times.

However, the Type ITB injection tool which, manufactured by THE BOWTHORPE ELECTRIC CO. LTD., Tinsley Lane, Crawley, Sussex, made its debut recently, has now improved that company's system considerably. Impregnation of the wood poles can now be carried out without excavating more than 10 c.f. of earth around the pole, thus the position of the tool for regularly spaced injections in a diamond formation is simplified. The method of operation is apparent from our illustration.

The ITB tool simplifies injection

TRADE PUBLICATIONS

LUBRICATION EQUIPMENT.—Leaflets describing the "Staufferlube" Multigreasor automatic grease lubricators which incorporate no valves and no springs, yet are capable of pumping all kinds of oil and grease under the most severe operating conditions are now available from Trier Bros. Ltd., Cumberland Works, Caldew Street, Camberwell, London S.E.5.

ILLUMINATION DESIGN.—First of a series of publications planned to illustrate the results of collaboration between architects and consulting engineers, and the Lighting Department of the General Electric Co. Ltd., Magnet House, Kingsway W.C.2, is a booklet entitled "Lighting Problems and their Solutions" No. 1,1952.

SWITCHGEAR.—Number 12 issue of the publication on switchgear produced by Cooke and Ferguson, Ltd., Openshaw, Manchester 1, is devoted to illustrations of a new 33 kV outdoor substation at Taunton, Somerset, for the South Western Electricity Board.

SYNTHETIC RESINS.—A new resin sandcore binder for Foundries "Resolite 400" is featured in a new bulletin issued by Aero Research Ltd., Duxford, Cambridge.

KITCHEN EQUIPMENT.—Now being issued to all owners of a Kenwood Mixer is the Kenwood News Letter a new series of four monthly publications designed by Kenwood Electrics Ltd., Woking, Surrey, to give news in advance of new developments and attachments, and to ensure that registered owners get first preference for new equipment.

VULCANISING EQUIPMENT.—Details of an electric vulcaniser employing a copper braided tape as medium for applying heat and pressure in the process of vulcanising cable sheath and core repairs are to be found in a new brochure issued by B.I. Callenders Cables Ltd., Norfolk House, Norfolk Street, London W.C.2.

FAN EQUIPMENTS.—Issued at an appropriate time is Sloan Electrical Co's Fans List for 1952. It illustrates the many models which the firm is able to supply. This list is available on request from the company at 31/33 Bondway, Vauxhall, London S.W.8.

ELECTRICAL EQUIPMENT.—Four publications just issued to the Trade by Simplex Electric Co. Ltd., Broadwell, Oldbury, Birmingham, are the Lighting Equipment price list. Publication No. L1909 the Creda Dulec Waterheater Specification folder No. WH.1737E. The hotcupboards specification sheet publication No. HC.1733C and the switches and switch fuses specification folder Publication No. S.W.1906.

VACUUM CLEANERS.—British Vacuum Cleaner and Engineering Co. Ltd., Leatherhead, Surrey, better known to dealers as the "Goblin" people, have now produced the first issue of a newspaper "BVC News" issued to publicise the manner in which the vacuum cleaner serves the world in all spheres.

CENTRIFUGES.—Sharples Bulletin 152, issued by Sharples Centrifuges Ltd., Woodchester, Stroud, Gloucester, describes the range of laboratory super centrifuges which the company produces.

The WEEK in NEWS

District Managers form Association

Birmingham Idea extended to whole Supply Industry

A NEW organisation to be known as the Association of District Managers has been formed in the electricity supply industry. Its main objects will be to promote close co-operation between district managers of single-headed organisations within the nationalised industry, and to guard the interests and welfare of members in matters affecting their positions and general status. It will also aim at facilitating the interchange of information and experience which might be beneficial to members in the execution of their duties.

The Association was actually inaugurated in Birmingham, and hitherto membership was confined to district managers of the Midlands Electricity Board of which, we understand there is 100% membership. The opportunity to join, however, has now been extended to all areas of the B.E.A. It is made clear that the scope of the Association does not cover senior officers of double-headed districts, as with some Area Boards.

It has been pointed out that there is no intention of encroaching on the functions of the negotiating machinery already established under the Act to settle terms and conditions of employment. Nevertheless it is felt that the body will be in a strong position to submit their opinions on those matters.

District managers wishing to join or obtain further details of this new Association should contact the hon. secretary, Mr. S. Raybould, at 83 Brandhall Rd., Langley, Birmingham.

STOP STRUGGLE TO CLOSE $ GAP

A SUGGESTION that the dollar gap was impossible to close and that this country should rather concentrate on developing trade with the Commonwealth, was made by Mr. H. W. Bosworth, president of B.E.A.M.A. at a luncheon at the Birmingham section of the B.I.F. last week. The appeal was based on evidence that high duties and freight charges, an unfavourable rate of exchange, and the "Buy American" Act, often robbed British firms of any chance of selling in the States. He thought it was almost hopeless to urge greater exports to America when trade associations there were straining to prevent us selling. Exports would have to be increased three times to close the gap in the face of competition from one of the greatest manufacturing countries in the world. Britain should make herself independent of dollars, he said.

He cited two instances of the implementation of the Buy American attitude. One involved the acceptance of a Swedish tender which was lower than an American firm's quotation, and the other concerned rejection of a British tender in favour of an American quotation $65,000 in excess.

SOME BOOKINGS ALREADY MADE FOR 1953 B.I.F.

ALTHOUGH the 1952 B.I.F. only closed last Friday, it is understood that numerous applications for space have been received from exhibitors in preparation for next year's Fair, which will coincide with the Coronation festivities and the influx of overseas visitors for that event. Attendance of overseas buyers at this year's exhibition was officially stated to be lower than in 1951. At the London sections numbers were down by 25% while at Castle Bromwich there was a decrease of some 30%. Total attendance figures also showed similar falls. On the other hand, over 1,150 American buyers were registered, a record figure. The largest number of overseas buyers from any one country came from Australia—apparently in expectation of an early relief from present restrictions.

One fact which emerged from the Fair just closed was the eagerness on the part of overseas visitors to buy small and medium-sized electric generators cables (especially armoured cables) and labour-saving machinery.

The First Half-Century

Speaking on Italian Railways, Prof. Carns-Wilson opened by giving some details of electric railways already in operation and some account of the causes which have led to the extension of electric working on Italian lines. Of these the chief is the competition of tramways, steam and electric, which threatens to destroy and divert the bulk of the traffic by offering more frequent service at lower fares. Hence the railways, merely to hold their own, are driven to an electric service of frequent, short, quick trains with a reduction of fares. The author's main point was that the reward was not to be looked for in reduction of working expenses: on the contrary, these would be increased. It must come, if at all, in extension of business.—*From our issue of May* 22, 1902.

M.E.B. Chairman forecasts Financial Loss

ELECTRICITY IN INDUSTRY SAVES COAL

SPEAKING at luncheon in Birmingham last week attended by representatives of the pottery industry, Ald. W. Lewis, chairman of the Midlands Electricity Board, predicted a substantial financial loss during the year 1951-52. The new tariffs had budgeted for an additional £1,800,000, which left a deficit of £3,200,000 which had to be covered by increased efficiency, he said later. Referring to costs, Ald. Lewis cited the increases in the price of coal, labour and other commodities which had risen by £5 million a year compared with 1948 when the industry was nationalised.

The chairman also had a word to say on the campaign being waged at present against the use of electricity. He rejected as untrue the suggestion that it was unpatriotic to use electricity in certain ways because solid fuel could do the work more economically. When the public knew the facts, he said, it would be agreed that it was in the country's interests to use more and more electricity. Ald. Lewis went on to say it was realised that a small rise in unemployment would end load shedding. This had unfortunately come about. Opponents of electricity continually spoke of the large amount of coal used for generation. He preferred to call it "slack" which was unsuitable for the gas industry or domestic use.

It could be said that the use of electricity in industry actually saved coal, the chairman said. The old intermittent bottle kiln in the potteries needed eight tons of good-quality coal for each ton of ware, but the latest electric multi-passage kiln used the equivalent of only half-a-ton of low-quality coal.

Another Electrical Exhibition in 1953?

EXHIBITORS, viewers and organisers alike, expressed satisfaction at the A.S.E.E. Exhibition held in London last March, and the venture was generally acclaimed to have been profitable to all concerned. Following that success, it is understood that plans are being laid for a similar show to be held next year. The venue, London's New Horticultural Hall, is expected to be the same and the dates approximately those of this year's debut.

As the number of exhibitors is almost certain to be a great deal bigger, a larger hall or even expansion to a second hall seems likely.

Aeronautical Fellowship

A NEW research fellowship valued at £500 a year at the College of Aeronautics, Cranfield, has just been announced by the English Electric Co. Its main purpose will be to promote the study of advanced problems in aeronautical engineering and holders will be concerned with vibration, stability and control of aircraft—factors which have added importance at this time when higher speeds are being attained. This is the second fellowship of its kind to be established by the company, the first being at Glasgow University last December.

RADIO INDUSTRY AT HOME AND ABROAD

BOTH good and indifferent news reached us last week concerning the radio industry. While the rate of export of British equipment continues to rise in a most encouraging manner, sales at home of radio and television sets fell slightly once again. As regards exports, during March the total value of goods exported, amounted to £2,265,000 as compared with £2,136,000 in February. The annual rate of exports during March was calculated at £26,232,000—well above the annual rate of 1951. During the first quarter of 1952 exports amounted to £6,558,000. These figures are based on Customs and Excise returns.

The less exciting news is contained in the R.T.R.A.'s figures for sales of radio and TV sets during the same month. The continued decline is thought to be due to the effect of recent hire purchase legislation. The average number of radios sold per shop in March was 6·73, as compared with 7·73 in February and 12·09 in March, 1951. Regarding TV the fall was even greater, namely 8·29 sets compared with 11·15 in February and 12·14 last year.

The Minister of Labour, Sir Walter Monckton, seen on the E.D.A. Midlands Electricity Board stand at the B.I.F., Castle Bromwich. He saw how electricity helped the pottery industry

INDUSTRIAL TARIFF IN NORTH WALES

PROPOSALS for standard tariffs for commercial and industrial purposes, to supersede 300 existing tariffs in the area, are announced by the Merseyside and North Wales Electricity Board. These proposals, placed before the area consultative council on Tuesday, are planned to operate from July 1. In all there are eight new tariffs, one of which, a flat rate of 4½d. p.u., is purely an alternative for small consumers. There are two block rate and one variable block rate tariffs, each with primary units at 4½d. Four other tariffs have a fuel price adjustment clause.

OFFICIAL PUBLICATIONS

BRITISH STANDARDS
B.S.G.100: *General requirements for electrical equipment and indicating instruments for aircraft. Price 6s.*

CODE OF PRACTICE
Code C.P.327.300: *Sound distribution systems. Price 6s.*

UNITS AND STANDARDS OF MEASUREMENT *employed at N.P.L. Second book. Photometry, Colorimetry and Radiometry.* H.M.S.O. 6d.

N. OF SCOTLAND H. E. BOARD. *Construction Scheme No. 63—Garry-Moriston Transmission Lines. Confirmation order 2d., and explanatory memorandum, 2d. (See page 962.) Both from* H.M.S.O.

BROADCASTING. H.M.S.O. 6d. *Report of Broadcasting Committee 1949.*

£204,000 for Rural Schemes in S. Wales

DETAILS of capital expenditure allocations during the next financial year were laid before the S. Wales Electricity Consultative Council, by the Area Board last week. The proposed expenditure of £2¼ million is some £450,000 higher than the current year's budget. Main topic for discussion was the question of rural electrification and the Council decided that the amount was inadequate for the expansion of services to farms. The Board is to be asked to seek an even greater allocation the following year. In the statement of expenditure, rural development had been allotted £204,000, as compared with £250,000 for industrial supplies. This rural allocation would enable the completion of the first part of the Board's 10-year rural development plan. One member estimated that at the present rate of spending it would take 25 years to complete their 10-year scheme which was estimated to cost £10 million.

Ald. A. E. Gough, chairman, pointed out that the £204,000 was in addition to the long-term development scheme. He warned members that they could put down half a million as their requirements next year, but they would not be able to spend it.

As regards allocations for other purposes, reinforcement of services will account for £527,000, new housing estates and new towns £220,000, and reinforcement of the present system £230,000. Provision of new points of bulk supply and reinforcement of existing supplies will cost £48,000, and £50,000 has been allotted for the purchase of office accommodation.

Radio Interference

THE increase in the use of electrical appliances and expansion of television has resulted in interference suppression becoming a problem, and very soon it may become a matter of legal obligation. It may be recalled that an Advisory Committee was set up early last month by the Postmaster-General (see our April 3 issue) to consider requirements which might be prescribed in regulations dealing with this problem. In order to help dealers choose and fit the best devices for suppressing interference, the Radio and Electronic Component Manufacturers Federation and Radio Industry Council has produced a small booklet under the somewhat revolutionary title of "Down with Interference." It will be distributed to dealers but is not available to the public.

Wimbledon Open Day

AN opportunity for friends and relations to be shown "the everyday task" was given last Saturday to employees at Foster Transformers and Switchgear Ltd., the South Wimbledon works of the Lancashire Dynamo Group. Some 700 staff and visitors took advantage of this open-day invitation and they were able to see the many processes that go to the production of transformers for welding and power uses.

In each shop of the factory a few machines were being operated, so that visitors were not left with unintelligible mechanisms to inspect, but could watch the work actually in progress. In addition, the test department demonstrated the thorough tests that are applied to completed transformers.

A group of visitors watching the operation of equipment in the special test department during Foster's Open Day last weekend

Lighting fittings made mainly of "Perspex" by the British Thomson-Houston Co. Ltd. were used by I.C.I. to illuminate an exhibition showing the uses of "Terylene" continuous filament yarn and staple yarn. Lighting was planned to give uniform distribution over all exhibits and ensure a good rendering of colours in materials ranging from dress fabric to insulation tape. Fluorescent fittings type F1214 were used

JOINT METER READING SCHEME TAKES SHAPE

THERE have been a number of suggestions from various quarters in recent months for a scheme whereby both gas and electricity meters are read by a single reader. This arrangement was practised in one or two municipalities prior to vesting day, where both industries were owned by the council, and steps are being taken by the nationalised Boards to give the proposal a trial in a few test districts. The aim is, of course, to try and effect some economy.

Two areas were originally selected for the trials, S.E. England and London. In London, the Board is negotiating with the North Thames Gas Board and details are being planned. The scheme is expected to concern the Board's N.E. sub-area. A third area has since been added. This is in the N.E. Electricity Board and there the arrangements are being made with the Northern Gas Board. Once the scheme, in the North at least, has been formulated, it will be run for a "fair period"—probably about three or four quarters.

B.E.A. pays Damages after Pylon Death

AN APPEAL against the dismissal of a claim for damages against the B.E.A. at Nottingham Assizes last December was allowed by the Court of Appeal recently. The widow of a linesman's mate who was killed when he fell from an electricity pylon last year, contended that her husband was not sufficiently warned of the danger and that there was a breach of the safety rules by the defendants.

Lord Justice Somervell said the current was cut off on one side of the tower only. He thought half the amount of damages should be paid. The court assessed total damages at £3,241 16s., and entered judgment for the woman for £1,620 18s., of which her two children would each receive £100.

L.E.B. Floodlighting

IT should be pointed out, following our report last week of the floodlighting of public buildings in London, that the total cost to the London Electricity Board will be about £500. Some confusion may have arisen over the reference to the scheme costing £10,000. The Board's part in the project is merely to supply the power.

Electric Whaling in Antarctic Proves a Success

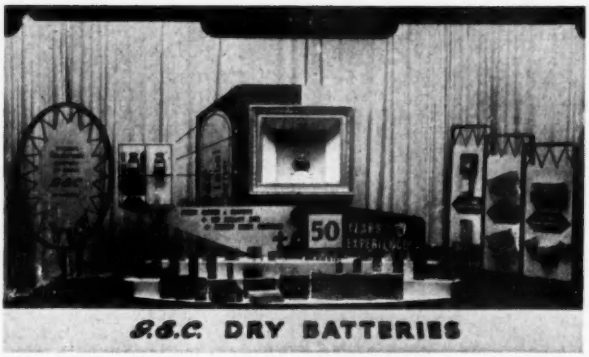
THE factory ship *Balaena*, owned by United Whalers, Ltd., has recently returned to this country from the Antarctic where two of her catcher vessels were equipped experimentally with the new type of whaling gun and electric harpoons. Details of this new electrical method of whaling were given in our April 17 issue, following preliminary experiments, but the *Balaena* has brought back information from the actual seasonal expedition when the harpoons were tried.

As a weapon the electric harpoon worked well. A satisfactory shot produced paralysis and the whale surfaced without a struggle. It was found also that the whale died within three minutes compared with two hours from a shot with an explosive harpoon.

Two new guns, one of British and another of Norwegian manufacture, have now been designed to fire a very light electric harpoon. Ships are now being equipped for a new trial off the North Norwegian coast in a month or two.

WEEKEND EXPLOSION AT KILMARNOCK

AS a result of an explosion last Sunday at Kilmarnock power station, four men were killed and several others badly injured, and considerable damage done. The explosion occurred in the switch house belonging to the S.W. Scotland Electricity Board while men were examining an oil-immersed switch handling 2,200 V. The original fault appears to have been the collapse of a supply line—the switch, designed to clear the fault, tripped. There was an oil leakage followed by the explosion and workmen were covered with oil which caught fire. Commenting on the accident, Mr. A. E. Roots, sub-area manager, said the damage was extensive and that there would probably be some difficulty in obtaining replacements.



Current display for dry batteries in the General Electric Co.'s window at Magnet House, Kingsway, London

NEWS IN BRIEF

The Electrical Trades Union is holding a Rules Revision Conference at Whitley Bay, Northumberland, from June 30 to July 11 inclusive. This is distinct from the annual Policy Conference which starts at Eastbourne next Monday.

The 44 houses of the Murray Lane scheme at Montrose will be the burgh's first all-electric council houses.

This year's Summer Meeting of the I.E.E.'s Southern Centre will take the form of a visit to Oxford on June 6. Inclusive cost is to be 22s. 6d.

National Smoke Abatement Society has published its Year Book for 1952. Besides information on the Society itself with the annual report and statement of accounts, a General Section deals with such items as the Simon Report and the Law Relating to Smoke, as well as giving a directory of organisations, selected list of papers and a guide to publications.

As a result of the annual ball staged by the Tees-side branch of E.I.B.A., a sum of £290 has been donated to the Association's funds.

Rooster Publicity Service Ltd. are sending a mobile photography unit to India and Pakistan to obtain illustrations of British plant, machinery and capital goods to help future export marketing schemes.

A new clock tower has just been completed at Lansbury Market Sq. The clock itself is automatically wound by an electric motor and driven by weights which would continue to drive the clock for two or three hours if the electricity supply temporarily failed.

Reference to the violin soloist in the Lessa Music Society report last week should have read Frank Tonge.

Many new amenities are being provided by the organisers of the International Machine Tool Exhibition which is being held this year between September 17 and October 4. They include a special lounge and sundry services, such as interpreters, stenographers' bureau, banking facilities and cable offices.

Objection to Ending of Wiring Rentals

DISCUSSIONS concerning the termination of arrangements for the rental of wiring installations took place at a meeting last Friday of the Eastern Electricity. Consultative Council. Those arrangements had been covered by an agreement which also combined the charges for electricity, and on the introduction of new standard tariffs, as the existing charges ceased so the Board decided to end the hire of wiring installations. This action had been resented.

The Board has explained that in most cases the installations would be vested in the consumer without any payment, and in the remaining case the price would not amount to more than £2. The Council resolved that the Board be asked to review their proposals and explore the possibility of either vesting all installations independent of age in the appropriate party, or continuing the arrangements for all consumers whose installation is less than 20 years old until that period has expired.

The good illumination needed for the drumming or beaming of rayon fibre, shown here, was obtained by using continuous runs of Benjamin Type HH flurolier trough reflectors, each housing twin 80 W fluorescent lamps and finished in "Crysteel" vitreous enamel. Note the upward light slots, each of which has a fin to give horizontal cut-off

Questions in Parliament . . .

Economic Relations with Scotland

Mr. A. Lewis asked the Prime Minister whether he would advise the appointment of a Royal Commission to review the economic relationships between England and Scotland, with any other important issues. It was intended to recommend that such a Commission be appointed, said Mr. Churchill, but consideration of its scope would have to await Lord Catto's Committee's report. This was investigating the economic and financial relations between Scotland and the rest of the U.K.

Stoking and Fuel Efficiency

Certification of stokers was being considered by the Fuel Efficiency Advisory Committee stated Mr. Geoffrey Lloyd in a written answer. He had been asked whether in view of the extent to which greater fuel saving might be achieved by increasing the efficiency of stoking, he would consider calling a conference to evolve such certification. Mr. Lloyd added that he proposed to await the Committee's report before calling a conference.

Fuel Policy Report

The Minister of Fuel and Power stated in a written answer last week that he hoped to have the report of the Ridley Committee on National Fuel Policy within the next few months.

Standardisation of Tariffs

Mr. Geoffrey Lloyd said last week that he would give no directions as to policy as regards the standardisation and co-ordination of tariffs throughout the U.K. Asked if he was going to take any action in the matter, he said his predecessor had approved general principles of the proposals put forward by the B.E.A. last year.

Deficit of Coal?

Coal production was almost exactly the same during the first four months of 1952 as it was in the same period last year, but the country was committed to 2,000,000 tons extra for exports and the B.E.A. requires an additional 2,500,000 tons. Mr. G. Nabarro asked where the extra coal would be found if this were true. The Minister said that in fact production was up by 700,000 tons in the period stated, that it was only part of the year, and that stocks were much higher. We were, 3,500,000 tons further on towards building up stocks by the end of the coal summer, he added.

Beryllium Copper Supplies

Giving information on supplies of beryllium copper, Mr. H. Strauss stated last week, that it was imported on private account, but shipments of the master alloy from the U.S.—the only source of supply at present—amounted to about 40 000 lb so far this year. He declined to give the volume of outstanding orders. Mr. Strauss went on to state that importers found it difficult to obtain supplies, but the position had become more encouraging. Beryllium copper will continue to be in short supply however, and it was impossible to predict when outstanding demand was likely to be met.

Sale of Electricity

Questioned concerning the sale of electricity during the last two years, Mr. Geoffrey Lloyd stated in a written answer on Monday, that the B.E.A. sold 50,480 million units during the twelve months ended March 31 last. During the previous year a total of 46,580 million units were sold he said. Mr. Lloyd added that in the first quarters of 1951 and 1952, the number of units sent out were 15,660 million and 16,412 million.

Recruitment for Electronics

The Minister of Labour was asked what action he was taking to enable the electronics industry to recruit in sufficient numbers the scientists and highly qualified technicians so urgently needed. Replying he said the matter was being studied closely by the Technical Personnel Committee. He hoped measures now being considered would be of practical assistance.

Recovering Sulphur

Answering a question on the recovery of sulphur from gases from coke ovens, Mr. H. Strauss stated that plant was being built for the recovery of some 10,000 tons of sulphur annually in the form of sulphuric acid. Other projects were also being considered.

Light-Castings Industry

As regards helping the light-castings industry to play its part in the export programme, Mr. H. Strauss said he presumed the questioner referred to such products as baths and cookers. He said his department was always willing to help wherever possible and would be pleased to know of any special difficulties.

Fuel Efficiency

He would take any suitable opportunity, Mr. G. Lloyd told the House last week, to make a statement on the activities of the Ministry's Fuel Efficiency Division during the year ended last month. He had been asked concerning staff, cost, new ideas brought forward, and whether any steps had been taken to secure broadcasting and television facilities for fuel efficiency propaganda

Prices of Lead, Copper and Zinc

The Secretary for Overseas Trade was asked why British manufacturers were being charged £147 a ton for lead, £231 for copper and £190 for zinc when overseas competitors can obtain those metals for £100, £196 and £156 a ton respectively. Replying, Mr. H. Strauss said the selling prices for copper and lead were based on replacement costs and neither metal was to be had in quantity by overseas buyers at the prices quoted. The Ministry's zinc price was being reviewed. The price of lead has been reduced to £131 per ton.

Electric Supply News . . .

Buckie

The change-over, involving more than 2,000 consumers, in Buckie's electricity supply from d.c. to a.c., which has been carried out in stages during the past two years, was finally completed last week. The last consumer to be changed over was incidentally the first consumer in the town to be connected up in September 1931, it is reported.

Eire

Under the amended water heating tariff, to which we referred last week, the flat rate of 1d. p.u. only applies to the six months, April to September; for the other six months the charge is 1d. p.u. for the first 360 units, and 0·7d. all in excess, the Electricity Supply Board informs us.

The Portarlington turf-fired power station of the Electricity Supply Board, generated 129 million units last year—43% more than the output for which the station was designed, it was revealed in the Dail last week by Mr. F. Aiken, acting Minister for Industry and Commerce. Bord an Mona supplied 119,752 tons of turf to the station from Clonsast in 12 months ending March last at 42s. 7d. a ton. In the E.S.B.'s stockpile were 25,664 tons. Ready for delivery from Clonsast to the station were 76,000 tons.

Glasgow

The £120,000 scheme of the South-west Scotland Electricity Board for the reinforcement of the 6·6 kV network in the southern district of Glasgow, to which we referred on April 24, involves modifications in the area supplied by the 132/33 kV substation at Govan, the construction of a 33/6·6 kV substation at the shipyard of the Fairfield Shipbuilding and Engineering Co. Ltd. and the provision of new equipment at five other substations in the vicinity. This follows the 33 kV network reinforcement scheme approved by the Board in 1949, which was based on the transfer of the load of the district from Dalmarnock generating station to the new power station at Braehead, near Renfrew.

Northern Ireland

The Electricity Board expects shortly to publish schemes for the hydro-electric developments on the River Bann and on the River Mourne which would have an effective output of more than 20,000 kW, the Minister of Commerce, Mr. W. V. McCleery, stated in Stormont, recently.

North Wales

The B.E.A. has decided not to proceed, in the North Wales Hydro Electric Power Bill 1951/52 now before Parliament, with the promotion of those provisions relating solely to the Ffestiniog scheme. Following discussions with interested parties, the Authority's advisers have considered further facts recently brought to their notice regarding geological and other conditions affecting the proposed reservoir at Llyn Cwmorthin and the measures to be taken to safeguard the adjoining quarry workings. In consequence, the Authority considers that further action on this scheme should be deferred to allow for a review and possible modification of these works.

N. Scotland

A scheme for the transmission of electricity by overhead lines from the power stations at Garry and Moriston to a transforming station to be erected at Fort Augustus, has been approved by the Secretary of State for Scotland. Under this constructional scheme, No. 63, prepared by the North of Scotland Hydro-Electric Board, the new transforming station at Fort Augustus will also be connected up with the Board's grid. Estimated to cost £930,000, the scheme will also provide initially for the construction of the Garry and Moriston works.

Peak District

The Development Control Committee of the Peak Park Planning Board has approved the installation of overhead electricity lines to supply Hurdlow Town, Hartington Middle Quarter, Foolow, Eyam, and Flagg.

LIGHTING SCHEMES

Haslingden.—T.C. has submitted to M.o.T. for approval a scheme for improved lighting along Manchester Road to the Ewood Bridge boundary.

Leyton.—T.C. recommended to apply for consent to borrow £2,000 for improvements in street lighting.

Northampton.—The divisional road engineer of the M.o.T. has agreed generally with the T.C.'s scheme for conversion of street lighting from gas to electricity, subject to small modifications, and to the work being spread over a period of five years. In the first year, the cost of converting streets to group "A" standard is estimated at £16,048.

Ormskirk.—The M.o.T. has informed the T.C. that the proposed street lighting scheme for road A.59 has had to be deferred because of lack of funds. The council has now asked the Ministry for approval to complete part of the scheme.

Wakefield.—The city engineer having reported that the majority of the old tram standards are badly corroded, the general works committee has approved plans for their replacement with concrete columns mounting 400 W mercury vapour lamps in Dioptrion lanterns, at a cost of £17,500.

Weymouth and Melcombe Regis.—T.C. recommended to borrow £2,100 for conversion of 70 gas lamps to electricity.

Company Activities . . .

Anglo-Portuguese Telephone Co.

As all the authorised capital has been issued it is proposed at the annual general meeting on June 5 to create an additional 1,000,000 Ordinary shares. In his statement, Sir Alexander Roger, chairman, points out that temporary loans from the associated concern, Telephone and General Trust Ltd., amount to £250,000, and further sums are required to pay for new plant and equipment already shipped or on order.

Automatic Telephone and Electric Co.

For 1951 the net group profit before charging taxation is £1,545,399 compared with £1,526,689 for the previous year. The final Ordinary dividend is again 12%, making 15% as before. U.K. taxation absorbs £809,104 (*£791,392*), overseas tax £24,945 (*£21,029*), leaving a net profit of £711,350 (*£714,268*) of which £710,530 (*£713,670*) is attributed to the holding company. There is £101,003 (*£57,637*) transferred to general reserve, £200,000 (*nil*) to replacement of fixed assets, £70,000 (*£255,000*) to stock reserve, £74,426 (*£77,206*) to scientific research, employees' provident fund nil (*£100,000*), and there is £451,659 (*£341,312*) carried forward.

Barton & Sons

For 1951 the consolidated trading profit, etc., for this firm of conduit manufacturers was £772,766, against £490,740 for the previous year. After charging depreciation, etc., and taxation of £359,263 (*£238,653*), the net profit is £295,930 (*£164,578*). The final Ordinary dividend is 10% (8⅓%), making 15% (12½%). The sum of £150,000 (*£80,000*) is placed to general reserve, and £130,350 (*£36,534*) is carried forward.

Calcutta Electric Supply Corpn. Ltd.

Gross revenue for 1951 was £4,350,537 (*£3,822,416*) and expenditure £2,990,838 (*£2,586,583*). The final Ordinary dividend is 3%, making 6%, tax free (*same*).

Chloride Electrical Storage Co.

For 1951, the trading surplus amounts to £3,142,754 compared with £2,274,190 for the previous twelve months. With investment income the total is £3,169,897 (*£2,298,308*). After charging directors' emoluments, audit fee, taxation of £1,713,700 (*£1,127,831*), and allowing £17,693 (*£13,647*) for outside shareholders, there is a surplus of £1,386,272 (*£1,103,506*). To this is added £182,829 (*£106,155*) provision no longer required, etc., and £616,902 (*£453,384*) brought in, making a total of £2,186,003 (*£1,663,045*) available. To depreciation and replacement £790,271 (*£503,575*), to subsidiaries £525,728 (*£337,401*), leaving the parent company balance of £870,004. The chairman, Mr. A. W. Browne, O.B.E., in his statement draws attention to the sum of £449,000 being transferred to reserve against the fall in value of stocks, bringing that reserve up to £2,126,500, and since the end of the year, a final settlement of the firm's E.P.T. liability has been reached in principle; as a result it is anticipated that a substantial amount from tax provision will be released during the current financial year.

Constructors Ltd.

The consolidated trading profit, etc., for 1951 is £157,143 (*£162,977*). The dividend is 20%, making 25% for the year on capital increased by 50% share bonus. Taxation absorbs £72,530 (*£67,379*), and depreciation £18,831 (*£17,499*). There is £100,480 (*£86,853*) carried forward.

Ever Ready Co. (Gt. Britain) Ltd.

This year's export sales show an increase of approximately 90% over last year's; it is to this very substantial increase in export turnover that the improvement in the trading profits is almost entirely due, Mr. E. N. Rowbotham, the chairman, explains in his statement. Home sales have also increased as compared with last year.

General Cable Manufacturing Co.

The directors have decided to offer to Ordinary shareholders rights to new 5s. Ordinary shares for subscription in cash at 10s. in the proportion of one for every five held.

N. Greening and Sons

Group net profit for the year to March 31 last is £103,351 (*£73,778*). After charging taxation of £146,456 (*£89,547*). To staff pensions £9,168 (*nil*), to fixed assets replacement £15,000 (*£10,000*), and to general reserve £60,000. The final dividend is 15% making 20% (*same*).

River Plate Electricity and Other Securities Corporation

Income from investments for the year to April 15 last was £86,354 (*£80,855*), and after charging taxation of £40,600 (*£36,133*), etc., the net profit is £41,046 (*£40,127*). The final Ordinary dividend is 7%, again making 10%.

John Thompson

Gross income from subsidiaries for 1951 is £524,917 (*£522,355*) and after taxation, etc., the net profit is £298,682 (*£303,486*). The final dividend is 12½%, making 22½% (*same*).

Vent-Axia Ltd.

The profit for the year to March 31 last is £105,559 (*£78,751*), before allowing taxation of £66,097 (*£46,806*). The final dividend is again 37½%, making 62½% (*same*). There is £20,000 (*£10,000*) placed to general reserve and £10,895 (*£10,459*) carried forward.

Dividends Declared

Bullers Ltd.—Interim of 5% (*same*) on capital increased by 25% scrip bonus.

General Cable Manufacturing Co.—Interim of 12% (*same*) payable on June 14.

Stream-Line Filters Ltd.—Second interim dividend of 10% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

May 24.—Durham. Electrical installation at Hetherington, Shildon All Saints and Shildon St. John's schools. Same at Byers Green, Elemore Hall special, and New Penshaw primary schools. These are separate contracts. G. R. Clayton, County Architect, Court Lane.

May 24.—Salford. Supply of one 22 ft tower wagon for street lighting department. Street Lighting Superintendent, Bloom St., Salford 3.

May 26.—Fife. Electrical work in extensions to St. Agatha's R.C. school, Methil. Applications to James Gentles and Son, Quantity Surveyors, Central Chambers, High St., Kirkcaldy.

May 26.—Hendon T.C. Supply and installation of cables for improved lighting along North Circular Rd. (Edgware Rd. to Hendon Way). J. L. Pelham, Borough Engineer and Surveyor, Town Hall, N.W.4. Deposit £2 2s. (See May 8 issue.)

May 26.—Sunderland T.C. Electrical installation in shops and flats in Hylton Lane. Borough Architect, Grange House, Stockton Rd. Deposit £2 2s.

May 26.—Wortley (Yorks) R.D.C. Installation of fittings and wiring in 234 houses on five sites. Arthur Wikeley, Engineer and Surveyor, Council Offices, Grenoside, nr. Sheffield. Deposit £2 2s.

May 27.—Seaton Valley (Northumb.) U.D.C. Electrical installation in 48 houses at Seaton Delaval, and 34 at Cramlington. Surveyor, Council Offices.

May 28.—Clare. Supply and installation of duplicate electrically driven pumping plant for Mountshannon water supply scheme. Nicholas O'Dwyer, consulting engineer, 6 Burlington Rd., Dublin. Deposit £5 5s.

May 28.—Friern Barnet U.D.C. Supply of metal filament lamps, sodium discharge lamps and jackets, and mercury-vapour lamps, for street lighting during period up to Mar. 31, 1953. Engineer and Surveyor, Town Hall, N.11. (See May 15 issue.)

May 28.—Manchester. Supply of about 100 intermediate concrete street-lighting columns. City Surveyor, (Room 329) Town Hall.

May 29.—Inverness. Electrical work in erection of hall-church at Dalneigh. Alexander Ross and Son, Architects, Queensgate Chambers.

May 30.—Brierley Hill U.D.C. Supply and erection of electrically driven centrifugal sewage pump at Heathbrook station. R. H. J. Comber, Engineer and Surveyor, Hawbush House, Brettell Lane.

May 30.—Longbenton U.D.C. Electrical installation in 128 houses at Burradon, 70 on Fordley estate, 32 at Forest Hall and 28 at Widespen. Separate contracts. Engineer and Surveyor, Council Offices, Forest Hall, Newcastle-on-Tyne. Deposit £1 1s.

May 31.—Carshalton (Surrey) U.D.C. Supply of electrically driven power baling press of about 25 tons a week capacity. Engineer and Surveyor, Stone Court, The Grove.

June 4.—Eston (Yorks) U.D.C. Electrical equipment for 200 houses. N. C. Harrison, surveyor, Normanby Rd., South Bank-on-Tees.

June 4.—Newmarket U.D.C. Supply and erection of (*a*) 11 concrete columns with lanterns and 400 W h.p.m.v. lamps and other equipment for Group A street lighting in Exning Rd.; and (*b*) 48 concrete columns with lanterns and 150 W tungsten lamps and auxiliary equipment for Group B lighting in Rous Rd., Vicarage Rd., Park Lane, Queen St., The Severals and Houldsworth Valley estate. F. B. Waterfall, Engineer and Surveyor, Severals House, Bury Rd.

June 5.—Belfast. Alterations to electrical installation at Edenderry intermediate school, Glenwood intermediate school and Park Parade intermediate school. Education Architect, Academy St., Belfast.

June 5.—Monaghan. Complete electrical installation in Divs. 3 and 4 of Mental Hospital. J. A. Kenny and Partners, Consulting Engineers, 44 Kildare St., Dublin. Deposit £5.

June 5.—Newbiggin-by-the-Sea U.D.C. Electrical work in 50 houses being built on Spital estate. H. Selby Robson, Surveyor to Council, Council Offices. Deposit £2 2s.

June 6.—Belfast. Supply and erection of 33 kV and lower voltage cables for Victoria power station. Documents from Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See April 24 issue.)

June 6.—Linlithgow T.C. Electrical work in erection of 34 houses on Mains Maltings site. N. S. Main, Town Clerk, Linlithgow.

June 9.—Durham. Installation of 34 street lighting units in New Elvet, Hallgarth St. and Church St., and nine fluorescent units in Saddler St. City Engineer Town Hall. (See May 8 issue.)

June 9.—Holland. Installation of electricity at Boston St. Thomas school. County Architects, County Hall, Boston, Lincs.

June 9.—North Walsham (Norfolk) U.D.C. Electrical installation at White Horse Common, U.9, comprising 40 lighting points. J. A. Yates, Surveyor, Council Offices, New Rd. Deposit £1 1s.

June 9.—Stocksbridge U.D.C. Provision of electrical installations in 93 houses on Wilson Rd., Shay House and Royd estates. Council's Surveyor, D. E. Robinson, Town Hall, Stocksbridge, Sheffield.

June 11.—Merthyr Tydfil T.C. Supply of equipment for electrical engineering laboratory and electrical installations workshop for College of Further Education. T. S. Evans, Town Clerk, Town Hall.

June 16.—Bristol. Supply of electrical stores for year ending June 30, 1953, for Cossham and Frenchay Hospital Management Committee. Secretary, Frenchay Hospital, Bristol.

June 16.—Ceiriog (Denbigh) R.D.C. Electrical installation in 40 houses and six shops with flats on Rhosywaen site, Chirk. R. W. Aubrey, Surveyor, The Mount, Chirk. Deposit £1 1s.

June 16.—Oldbury T.C. Provision and erection of 26 concrete street lighting columns with time switches, h.p.m.v. discharge lamps in Class A, and for fixing only of lanterns and auxiliary equipment. Borough Surveyor, Municipal Bank Chambers. Deposit £2 2s.

June 18.—Burton-on-Trent T.C. Replacement of 43 lamps and conversion from gas to electricity in various streets. Borough Surveyor, Town Hall. (Advertised in this issue.)

June 18.—High Wycombe T.C. Supply and erection of (*a*) steel columns (from stock) and installation of auxiliary equipment, lanterns and wiring, etc.; and (*b*) supply of lanterns, 400 W mercury lamps and sets of auxiliary apparatus for street lighting along trunk roads A.40 and A.4010. J. A. Parkinson, Borough Engineer and Surveyor, Municipal Offices, Queen Victoria Rd. Deposit £2 2s. (Advertised in this issue.)

June 23.—Wanstead and Woodford B.C. Installation of 160 W blended lighting in Group B on 23 routes. Included: (*a*) provision of lanterns, control gear and fittings for extension and conversion to electric lighting of about 270 existing gas columns and same for about 100 gas columns; and (*b*) provision and erection of about 70 concrete columns with lanterns and control gear. Borough Engineer and Surveyor, Municipal Offices, High Rd., Woodford, E.18. Deposit £2. (Advertised in this issue.)

July 16.—Gloucester. Supply and installation of two electrically driven well pumps at Newent station. Pumps to be driven by shafts from vertical motors on surface. J. H. Goodridge, City Surveyor and Water Engineer, 21 Eastgate St. Deposit £2 2s. (Advertised in this issue.)

No date stated.—Littlehampton U.D.C. Electric wiring for installations to bungalows on Wickbourne estate. Particulars from Engineer and Surveyor, Council Offices. Deposit £1 1s.

OVERSEAS

Details of items marked may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

June 9.—Greece. Supply and installation of three electrically driven freight elevators for Reconstruction Procurement Committee of Ministry of Public Works, 7 Themistocleous St., Athens. B.o.T. (Ref.: CRE 17740/52).*

June 10.—Australia. Director, Posts and Telegraphs, Melbourne, invites tenders for supply of large quantities of condensers to various specifications. Tenders may be lodged with Chief Supply Officer, Australia House, Strand, W.C.2. B.o.T. (Ref. CRE 17753/52).*

June 10.—Australia. Supply of considerable quantities of telephone transmitters and parts to various specifications for Director of Posts and Telegraphs, Melbourne. Tenders to Chief Supply Officer, Room 406. Australia House, Strand, W.C.2, B.o.T. (Ref.: CRE 17677/52).*

July 16.—Uruguay. Supply of diesel motor generating set of about 3 kW for continuous current of 110 V with accessories; nine electric radiators similar to those for hot-water heating of 700 W each; and one heliocoidal ventilator with ½ h.p. motor, for orifice of about 0.40 m in diameter. Administracion Nacional de Puretos. B.o.T. (Ref. CRE 15788/52).*

June 30.—N. Rhodesia. Municipality of Livingstone invites tenders under specification No. L.S.2/1952 for 11 kV and l.v. cables, overhead lines and switchgear. Consulting Engineer, J. S. Clinton, P.O. Box 4648, Johannesburg. Deposit £3 3s.

July 21.—S. Rhodesia. Supply and erection of a 30 MW turbo-alternator, condensing plant and auxiliary apparatus, two 210,000 lb per hour boiler units, and circulating water pumps, for power station No. 3, Salisbury. Documents available from Council's Consultants, Merz and McLellan, Carliol House, Newcastle-on-Tyne.

No date stated.—Egypt. Supply of workshop equipment for H.-E. power station at Aswan Dam. Consulting Engineers are Kennedy & Donkin, 12 Caxton St., S.W.1. Deposit £E10.

No date stated.—Australia. First stage to begin of proposed 3,000 MW hydro-electric development of Snowy, Murray and Tumut Rivers, and tenders invited for supply, erection and maintenance of generators and turbines comprising four 3-phase 50 c/s vertical shaft Francis-type water wheel-driven generators each having continuous maximum rating of 80,000 kW for power station on Tumut River by Snowy Mountains H.-E. Authority. London office: 18 St. George St., Hanover Sq., W.1. Closing date for tenders expected to be in October.

Your Queries — Answered

"Maisyvac" vacuum cleaners, makers of? T.H.—Sterling Eng. Co., Ltd., Sterling Works, Dagenham. (22985)

"Nodark" switchgear, makers of? T.E.—Power Equipment Co., Ltd., Kingsbury Works, Kingsbury Rd., N.W.9. (22997)

Joyce, Loebl and Co., Ltd., address of? L.E.—Arch Works, Pointers Heugh, Dean St., Newcastle-on-Tyne. (23006)

"Betterway" poultry equipment, makers of? T.B.—Betterway Electrical Products Ltd., Stalham, Norfolk. (23009)

Kettles to operate from 12 V batteries, makers of? S.F.—Marris Ltd., Cumberland St., Birmingham. (23018)

The "Aerovap" and similar insect destroyers, makers of? M.A.—Shepherds Aerosols Ltd., 23a Old Bond St., W.1; Falk Stadelmann and Co., Ltd., 91 Farringdon Rd., E.C.1; Aerosols Ltd., 116 Wigmore St., W.1. (23024)

"Beatty" washing machines, agents for? H.E.—Beatty Bros. (Tenbury) Ltd., Station Buildings, Stamford New Rd., Altrincham, Ches. (23031)

"Itonia" irons, makers of? N.M.—These were made by the Itonia Co., Ltd., a firm which went out of business about a year ago. The spares were taken over by Mr. H. Chapman, 71 Goldsworth Rd., Woking, Surrey. (23038)

The above are selected from questions we have answered this week. If you have a query, send it to us.

TRADE NOTES

Beama Contract Price Adjustment Formulae.—*For Electrical Machinery and Equipment.*—For purposes of calculating variations in: (a) "Rates of Pay"—the rate of pay for adult male labour at May 17, 1952, shall be deemed to be 134s.; (b) "Cost of Material"—the index figure for materials used in the electrical machinery industry published in the Board of Trade Journal on May 17, 1952, is 166·3.

For Turbo-Generating and Allied Plant.—For purposes of calculating variations in: (a) "Rates of Pay"—the rate of pay for adult male labour at May 17, 1952, shall be deemed to be 134s. (b) "Cost of Material"—the index figures published in the Board of Trade Journal on May 17, 1952, are: materials used in mechanical engineering industries 152·5, "Blast Furnaces and Iron and Steel Melting and Rolling (40 and 41)" 142·6; the price of brass condenser tubes ¾ in. o/d, 18 s.w.g. published in The Metal Bulletin on May 16, 1952, is 3s. 7½d.

For Outstanding Contracts covered by the B.o.T. Intermediate Products Index.—For purposes of calculating variations in: (a) "Rates of Pay"—the rate of pay for adult male labour at May 17, 1952, shall be deemed to be 134s. (b) "Cost of Material"—the index figure for intermediate products published in the Board of Trade Journal on May 17, 1952, is 366·6.

Change of address. The Scottish area sales office of George Ellison Ltd. has moved to larger premises at 7 Woodlands Terrace, Glasgow C.3. Tel.: Douglas 5335.

Indian Import Control. The revised licensing procedure governing the issue of quota licences to established importers has been extended to include: electric lamp bulbs (except torch bulbs), g.s. lamps up to 500 W, train-lighting lamps, studio and projector lamps, and fluorescent tubes.

Holidays. British Insulated Callender's Cables Ltd. announce that the Prescot, Helsby, Huyton Quarry and Melling works will be closed from July 25 to August 9; Willenhall Foundry will be closed from July 26 to August 9; Erith Works from July 19 to August 4, and Anchor Works, Leigh, from July 5 to 12 and September 6 to 13.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	240 0 0	£220 0 0
LEAD, good soft pig (foreign)	131 0 0	120 0 0
,, ,, ,, "English" quality ...	132 10 0	
Tin (99·99·75%) ... ...(Cash)	962-964	—
,, (3 months)	957-957½	—
ALUMINIUM, commercial purity (del.)	154 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	59 10 0	—
Mild Steel Tape (0·04 in.)	39 15 0	—

CONTRACTS PLACED

Carlisle T.C. Supply of street-lighting columns and fluorescent lanterns, Revo Electric Co., Ltd., £520; supply of columns and silver-blue lanterns for Brampton Rd., £2,575, same in Warwick Rd., £2,039, same at the Viaduct and Denton Holme, £2,097, also supply of columns and dioptron lanterns for London Rd., £2,158, same for Scotland Rd., £3,906, all to Ben Oliver.

Hull. Provision of electrical installations in 52 dwellings on Bilton Grange estate, Humber Electrical Engineering Co. Ltd., £2,147. Same at Barham secondary school, A. Shaw and Sons, £7,832.

Newark T.C. Supply and erection of 132 concrete street lighting columns and four wall brackets with 400 W mercury lighting equipment, North Midlands Engineering Co., Ltd., £6,244.

Poplar B.C. Electrical installation in blocks of flats in Teviot St. area, London Electricity Board, £9,906; installation of four lifts in same, Express Lift Co., £8,300.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Allinson, Leake and Co. Ltd., 102 High West St., Gateshead 8. Plumbers, heating, ventilating, lighting, mechanical, electrical and radio engineers, etc. Cap.: £10,000. Dirs.: J. T. Leake, Isabella M. Leake and Doreen Leake, and J. Bell.

O. Carmichael and Son Ltd., 75 High St. West, Gateshead-on-Tyne. To take over business of a motor cycle and electrical engineer carried on at Gateshead-on-Tyne by Leslie D. Carmichael as "O. Carmichael and Son." Cap.: £1,000. Permt. dirs.: L. D. Carmichael and Mrs. C. Carmichael.

McGhee-Burton Technical Services Ltd., 2 Willow Place, Rochester Row, S.W.1. To take over business of McGhee-Burton Technical Services carried on at Willow Place, S.W.; power plant efficiency specialists and consultants, general engineers, etc. Cap.: £1,000. Dirs.: A. J. G. Burton and F. L. McGhee.

Morgan Brothers (Mountain Ash) Ltd., 29a Oxford St., Mountain Ash. Manufacturers of and dealers in electrical and mechanical apparatus and components, etc. Cap.: £1,000. Dirs.: H. Morgan and T. Morgan, K. O. Longstreet and J. James.

Sparcatron Ltd., Abbey Yard, Bath. To acquire and exploit inventions relating to improvements in methods and apparatus for cutting electrically conductive materials; and to carry on business of mechanical, electrical and constructional engineers, etc. Cap.: £15,000. Dirs.: W. F. Long, S. L. Amor, A. R. Davies, G. Fefer, A. N. Pictor, A. D. P. Tallents and D. W. A. F. Rudorff.

Waldaire Ltd. Manufacturers of and dealers in refrigerators and all kinds of freezing, cold-storage, air-conditioning, heating, cooking and lighting equipment, etc. Nom. cap.: £100. Dirs.: not named. Subs.: G. Meagher and May Meagher, 16 St. Thomas' Rd., St. Anne's-on-Sea.

Worthing Assembly Co. Ltd. Assembly and manufacturers of and dealers in all kinds of aircraft parts, equipment, plant, apparatus, electric and electronic equipment, etc. Cap.: £500. Dirs.: C. S. W. McNaught and Mrs. M. M. McNaught, addresses not stated. Subs.: M. A. Bryceson and K. A. Wyndhay-Kaye, Essex House, Essex St., Strand, W.C.2.

BUSINESS PROSPECTS

HOME

Aberdeen. The Aberdeen Grit Co. Ltd. are to build a factory at Tullos.

Barton-on-Humber U.D.C. Preliminary plans approved for 60 houses to be built at Providence Field.

Bathavon R.D.C. Erection of 102 dwellings at Red Post, Peasedown. Council's Architect, W. A. Williams, 5 Wood St., Bath.

Belfast. Approval granted for erection of Ashfield Intermediate school at estimated cost of £275,000.

Bexley T.C. Erection of 60 dwellings on Bristowe Rd. estate. Borough Engineer and Surveyor, West Lodge, Broadway, Bexley Heath.

Bury St. Edmunds T.C. Construction of 32 houses on Mildenhall Rd. estate. Borough Engineer and Surveyor, N. G. Goldsmith, Borough Offices.

Carlisle. Extensions and additions to be carried out by J. Laing and Sons to their premises in Kingstown Rd., by J. K. Innes and Co. Ltd. to works in Kingsmoor Rd., and by Kingstown Engineering Co. Ltd. to factory at Kingstown Airport.

Chelmsford T.C. Six shops with eight flats and two blocks of flats to be built on Chignall estate.

Consett U.D.C. Application to be made for sanction to borrow £135,646 for erection of 98 houses in Durham Rd., Leadgate. Also, approval has been given to plans for proposed central depot at Villa Real.

Dartford T.C. Erection of a total of 114 dwellings in two contracts at Temple Hill. Borough Surveyor, Barclays Bank Chambers, High St.

Dover T.C. Forty-four houses to be built on Coxhill estate.

Dudley T.C. Tenders to be invited shortly for erection of 204 flats on Old Park Farm estate, Coseley; plans also being laid for erection of 246 dwellings on Sledmere estate.

Esher U.D.C. Erection of 36 flats in four blocks on Faraday Rd. estate, West Moseley. Engineer and Surveyor, Council Offices.

Farnborough (Hants) U.D.C. Plans approved for erection of 348 houses and flats at Fox Lane (North), Hawley.

Godalming T.C. Recommendation made to apply for sanction to borrow £2,505 for construction of electricity mains and services for 156 houses on Brinscombe Farm estate.

Gosforth (Northumb.). Plans approved for erection of hospital and convalescent home at St. Nicholas' Hospital for Newcastle Regional Hospital Board, "Dunita," Osborne Rd., Newcastle. P. H. Knighton is the architect.

Halesowen T.C. Erection of 30 houses on Howley Grange estate, Lapal. Architect, J. C. T. Cole, Central Bldgs., Long Lane, Blackheath, near Birmingham.

Haverfordwest (Pemb). Admiralty is to build 200 houses for naval personnel.

Hove T.C. Erection of 72 flats under two contracts on St. Helen's estate. Borough Surveyor, T. R. Humble, Town Hall.

Hull. W. H. Smith and Son Ltd. propose to build premises in Canning St. at estimated cost of £60,000.

Tenders will shortly be sought for installation of electric light in infants' dept. of Newland C. of E. school.

Ilkeston T.C. Stanton Housing Co., Ltd. propose to build 177 houses on Kirk Hallam estate, being the remainder of their total allocation of 313 houses.

Ince-in-Makerfield U.D.C. Application to be made for sanction to borrow £55,900 for first 40 houses on Butterby St. site.

Kilmarnock T.C. Dean of Guild Court has approved erection of 131 houses on various sites.

Limerick. E.C. to erect extension to St. Anne's Vocational School, £18,010; and a school of commerce at cost of £49,700.

Manchester. Plans are being prepared for construction of first block of 11 shops to be built at Brooklands Main Centre.

Mansfield T.C. Erection of 86 houses on Ladybrook estate under two contracts. Borough Engineer and Surveyor, Carr Bank.

Nantwich R.D.C. Construction of 48 houses in Wistaston Green scheme. H. Crabtree, Engineer and Surveyor, Stapeley House, nr. Nantwich.

Peterborough. F. Perkins Ltd. are to extend their Eastfield factory.

Petersfield (Hants) R.D.C. It is proposed to erect 42 houses at Bramshott, four at Clanfield, 14 at Rowlands Castle, ten at Horndean, and 32 on various other sites.

Plymouth. It is proposed to carry out additions at Eagle Works, Sutton Rd., for J. H. Lang and Son, Ltd.

Plymouth. Council recommended to approve erection of 52 dwellings in Bodmin Rd. and 48 flats in Notte St.; also 88 dwellings in Old Woodlands Rd.

Pocklington (Yorks) R.D.C. Three-year programme provides for 72 houses at Pocklington, 76 at Market Weighton, 44 at Stamford Bridge, 14 at Bishop Wilton and 12 at Sancton.

Scunthorpe. County Council is to proceed with erection of new Westcliffe secondary school. Plans are by County Architect, County Offices, Lincoln.

Southwick (Sussex) U.D.C. Erection of 48 houses on Windmill site. Engineer and Surveyor, Town Hall.

Tiverton (Devon) R.D.C. During next three years it is proposed to build 222 houses and issue 70 private enterprise housing licences.

Wakefield. Erection of 100 flats in blocks of four on Flanshaw estate, at Lupset and at Eastmoor. Room 32, Town Hall.

Wantage U.D.C. Erection of 40 houses on Springfield Rd. site. Council's Architect, W. G. Stanbrook, 37a Bartholomew St., Newbury.

OVERSEAS

U.S.A. Hutchins Electric Co., of Ridgway, Pennsylvania, would like to contact European firms interested in making their single-phase induction motor under licence. Nolin Manufacturing Co., Montgomery, Alabama, wish to license firms for manufacture of their refrigeration equipment. And Refrigeration Engineering Inc., of Los Angeles, are interested in licensing firms for manufacture of their evaporators and coils. Mr. Rindfleisch, Creative Dept., Brown and Bigelow, 1286 University Ave., St. Paul, Minnesota, would like to receive offers for advertising novelties from U.K. firms. New and original ideas required.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Asbestel. 704,007. Class 9. Asbestos - insulated, stainless-steel-sheathed electric conductors or cables. Pirelli-General Cable Works, Ltd., 343/345 Euston Rd., N.W.1.

Contactorel. B702,447. Class 9. Electronic contactors. Ateliers de Constructions Electriques de Charleroi, 33 rue du Congres, Brussels, Belgium.

Smiths. 702,023. Class 9. Electric cigar and cigarette lighters, etc. 702,024. Class 11. Car heaters, car air-conditioning apparatus, etc. S. Smith & Sons (England) Ltd., Cricklewood. Works, Edgware Rd., N.W.2.

Transrad. 705,005. Electrical apparatus in Class 9. Bertrand Zucker, 138A Cromwell Rd. S.W.7.

Unimac. 704,333. Class 9, Electric fuses, switches and switchgear. C. H. Parsons, Ltd., Britannia Works, Wharfdale Rd., Tyseley, Birmingham 11.

Mekelite. B705,168. Class 9. Electrical apparatus and instruments. Mek-Elek Engineering Ltd., 17 Western Rd., Mitcham, Surrey.

Mageon. 705,521. Class 9. Electrically illuminated signs, etc. Juneero Ltd., Stuart Works, Sterling Corner, Boreham Woods, Herts.

MEETINGS TO NOTE

FRIDAY, MAY 23

I.E.E. (London Utilisation Section).—"Use of Electricity in Modern Iron and Steel Works." W. F. Cartwright. Savoy Place, W.C.2. 6.30 p.m. (postponed from May 5).

MONDAY, MAY 26

INCORP. PLANT ENGRS. (Yorks Branch).—"Plant Reorganisation." A. G. Dewhirst. Leeds University, 7.30 p.m.

ELECTRICAL TRADES UNION. Annual Policy Conference opens at Eastbourne.

WEDNESDAY, MAY 28

C.I.G.R.E. CONVENTION.—Fourteenth sessions opens at Fondation Berthelot, Rue Saint-Dominique, Paris, and continues until June 7.

I.E.E. (London Radio Section).—"Recent Progress in Colour TV Technique in U.S." A. G. Jensen. Savoy Place, W.C.2, 5.30 p.m.

FRIDAY, MAY 30

INCORP. PLANT ENGRS. (Birmingham Branch). "Refrigeration." A. C. Curgenvom. Imperial Hotel, 7.30 p.m.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

J. Rhodes and Co. insulation engineers of Haley Hill, Halifax. Partnership between Thomas Shelley, Jack Rhodes and James F. Rhodes dissolved as from September 25, 1950. Debts received and paid by J. Rhodes and J. F. Rhodes, who will continue business.

Eden Machine Tool Co. Ltd., electrical engineers and tool makers, Edenbridge, Kent. Liquidator, J. M. Clarke, Official Receiver, Inveresk House, 346 Strand, W.C.2, released as from April 24.

Round and Green (Birmingham) Ltd., manufacturers and dealers in electrical goods at Shirley. Last day for receiving proofs, May 28. Liquidator is G. A. Clifford, Dilsworth House, 190 Broad Street, Birmingham.

Milward (Electrical) Ltd. Last day for receiving proofs, May 31. Liquidator is R. K. Clark, Somerset House, 37 Temple St., Birmingham.

R. John Benney and Co. Ltd Edward G. S. Jackson, 81 Queen's Rd., Bristol 8, has been appointed liquidator.

Llanfair Caereinion Electric Society Ltd. Meeting of members is to take place at the Institute, Llanfair Caereinion, Montgomeryshire, at 7 p.m. on June 11 in order to receive liquidator's report.

Camley Engineering Co. Ltd. Meeting of members will be held at 87 Cookridge St., Leeds 2, on June 23 at 11 a.m. to receive liquidator's report.

Henray Electrical Co. Ltd., 53 Queen Anne St., W.1. Winding-up order dated May 12. Petition presented on April 28.

BANKRUPTCY ACTS

Application for Discharge

Croydon (Greenwich). James Robertson, electrical engineer of 68 Arran Rd., Catford. Hearing has been fixed for 10.30 a.m. on June 19 at County Court, Scarbrook Rd., Croydon.

Appointment of Trustee

Chester. John V. Barke, electrical engineer of 21 Circular Drive, Chester. Trustee is S. O. Henry, 5 Rumford Place, Chapel St., Liverpool.

Dividends

Canterbury. Nicholaas A. R. Spreeth and Stanley H. Price, trading as Refrigeration Installations Co. at Sea St., Herne Bay. First and final dividend of 2s. 2d. in £ payable on May 27 at Midland Bank Chambers, Herne Bay.

Shrewsbury. Frederick A. Walmesley, electrical contractor, trading at 48 Wyle Cop, Shrewsbury. First and final dividend of 11·625d. in £ payable at Official Receiver's Office, 12 Lonsdale St., Stoke-on-Trent, on May 28.

Receiving Order

Stoke-on-Trent. Douglas G. Edwards, electrical engineer, trading at 8 Blackfriars Rd., Newcastle-under-Lyme. Date of receiving order, May 14.

Intended Dividends

Salisbury. Harold Cooke, wireless and electrical engineer, trading as Western Wireless at 33 Fisherton St., Salisbury. Last day for receiving proofs, May 31. Trustee is W. H. Meredith, Official Receiver, 54 Endless St., Salisbury.

Sunderland. John R. Short, electrical contractor, trading at 11 Rutland Ave., Bishop Auckland. Last day for receiving proofs, May 31. Trustee is R. F. Howe, Official Receiver, 54 Westgate Rd., Newcastle-on-Tyne.

Private Arrangement

Arthur Edward Bennall, Jnr., trading as The North West Radio and Electrical Equipment Co., 224a Church St., Blackpool. Wireless and electrical equipment dealer. At meeting of creditors statement of affairs submitted showing liabilities as £4,443, of which £2,265 was due to trade and loan creditors; £2,107 to partly secured creditors; and £75 to preferential creditors. Assets were estimmated to realise £2,352 and after deducting £75 due to preferential creditors, there were net assets of £2,250. After full discussion, creditors resolved that the matter should be dealt with under a Deed of Assignment in favour of Mr. R. F. Bendall, F.C.A., of Poppleton and Appleby, 31 Lloyd St., Manchester, as trustee of the estate. Committee of inspection was also elected.

Architects : Lunn & Lunn, Milnsbridge, Huddersfield

Here's another first class industrial wiring job — at Kirkburton's fine new textile mill owned by B. H. Moxon & Sons, Ltd.

Electrical Contractors :

JESSOP BROTHERS
17, Beast Market, Huddersfield

and

T. W. BROADBENT LTD.
East Parade, Huddersfield

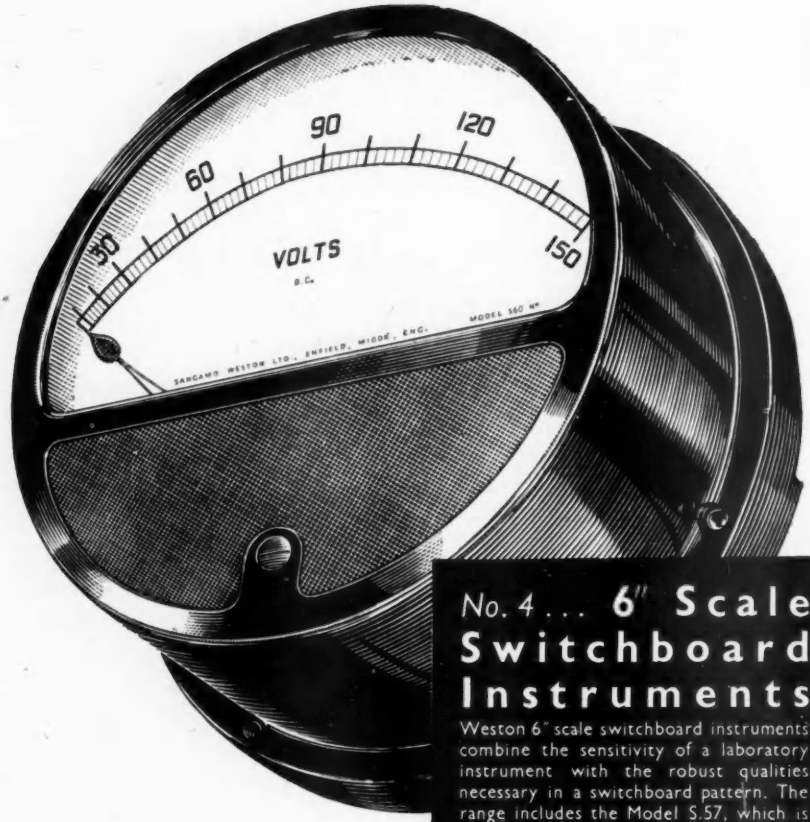
(Representatives in Huddersfield area for Fluorescent Applications Ltd., whose factory lighting system is shown in the centre picture).

HENLEY CABLES

were used for power and lighting circuits

BY APPOINTMENT ELECTRIC CABLE MANUFACTURERS

W.T.HENLEY'S TELEGRAPH WORKS CO. LTD. 51-53 HATTON GARDEN, LONDON. E.C.1



No. 4 . . . 6" Scale Switchboard Instruments

Weston 6" scale switchboard instruments combine the sensitivity of a laboratory instrument with the robust qualities necessary in a switchboard pattern. The range includes the Model S.57, which is supplied as a D.C. Microammeter, Milliammeter, Ammeter or Voltmeter: The S.58 which incorporates a thermocouple for the measurement of H.F. currents and is available as a Milliammeter or Ammeter: The Model S.59, incorporating a metal rectifier for the measurement of A.C., is supplied as a Milliammeter or Voltmeter and the Model S.60 is a Moving Iron Instrument for A.C. or D.C. measurement and is available as a Milliammeter, Ammeter or Voltmeter. The illustration shows the Model S.60 in the projecting type case. All models are available in either projecting or flush type moulded Bakelite cases. Further information and full details of the ranges supplied available on request.

WESTON

Electrical Measuring Instruments

SANGAMO WESTON LIMITED

Enfield, Middlesex. *Tel: Enfield 3434 (6 lines) & 1242 (4 lines).* *Grams: Sanwest, Enfield*

Branches: Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton & Brighton

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

GLOUCESTER CORPORATION WATER UNDERTAKING

ELECTRICALLY DRIVEN WELL PUMPS, NEWENT PUMPING STATION MODERNISATION

TENDERS are invited for the SUPPLY AND INSTALLATION of two electrically driven well pumps at the above station, and incidental work in connection therewith. The pumps are to be driven by shafts from vertical motors on the surface. The capacity of each pump will be 42,500 gallons per hour and the total motor h.p. to be installed will be approximately 200.

Conditions of contract, specification, schedule of prices and form of tender may be obtained from J. H. Goodridge, A.M.I.C.E., A.M.I.W.E., City Surveyor and Water Engineer, 21 Eastgate Street, Gloucester, on payment of a deposit of two guineas, which will be refunded on receipt of a bona fide tender (not subsequently withdrawn).

Tenders sealed and endorsed "Contract No. 16 Wa—Pumping Plant at Newent Pumping Station" must be received by the undersigned not later than 12 noon on Wednesday, July 16, 1952.

The lowest or any tender will not necessarily be accepted.

L. O. NEED,
Town Clerk.

Guildhall, Gloucester. (S 352)

COUNTY BOROUGH OF BURTON-UPON-TRENT

ELECTRIC STREET LIGHTING
REPLACEMENT OF 43 LAMPS AND CONVERSION OF 80 COLUMNS FROM GAS TO ELECTRICITY

THE CORPORATION invite Tenders for the carrying out of the above-mentioned street lighting works in various streets in the County Borough of Burton-upon-Trent.

Conditions of Contract and a Street Map showing the location of the lamps may be seen, and specification and form of tender may be obtained on application to the Borough Surveyor, Town Hall, Burton-upon-Trent.

Sealed tenders, in envelopes to be provided, must be delivered to the undersigned not later than 10 a.m. on Wednesday, June 18, 1952.

The acceptance of a tender will be subject to the Standing Orders of the Council with respect to contracts (a copy of which may be obtained on application to the Borough Surveyor) and to the execution of a formal contract.

The Council do not bind themselves to accept the lowest or any tender.

H. BAILEY CHAPMAN,
Town Clerk.

Town Hall,
Burton-upon-Trent.
May 23, 1952. (S 353)

BOROUGH OF HIGH WYCOMBE

STREET LIGHTING
London-Fishguard Trunk Road No. 10 (A.40)
(Crendon Street to West Wycombe—(Bradenham Road A.4010).

TENDERS are invited for the following:

1. SUPPLY AND ERECTION of steel lighting columns and installation of auxiliary equipment, lanterns, wiring, etc., taking down and re-erecting a number of existing steel columns in new positions, supplying and fixing new bracket arms to existing steel columns. (Note.—Steel columns will have to be supplied from stock as a steel authorisation will not be available.)

2. SUPPLY OF LANTERNS, 400 watt Mercury Discharge Lamps and sets of auxiliary equipment.

Specifications, Bills of Quantities and Forms of Tender may be obtained from the undersigned on receipt of a

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cheque for £2 2s. in respect of each set of documents which will be returned on submission of a bona-fide tender.

Plans and conditions of contract may be inspected at the Borough Engineer's Office, Municipal Offices, Queen Victoria Road, High Wycombe.

Tenders in a sealed envelope which shall bear no name or mark indicating the sender, but endorsed:

1. "Tender—Supply and Erection of Lighting Columns."
2. "Tender—Supply of Lanterns and Auxiliary Equipment" must be delivered to the undersigned not later than noon on Wednesday, June 18, 1952.

The Council do not bind themselves to accept the lowest or any tender.

J. A. PARKINSON,
Borough Engineer and Surveyor.

Municipal Offices,
Queen Victoria Road,
High Wycombe. (S 354)

BOROUGH OF WANSTEAD AND WOODFORD

DISTRICT ROAD LIGHTING (GROUP B)

TENDERS are invited for the INSTALLATION of 160 W blended lighting on 23 routes within the borough. The work includes (a) provision of lanterns, control gear and fittings in connection with:—

(1.) Extending and converting for electric lighting, existing cast-iron gas-lamp columns in the streets and erecting in new position. (Approximately number 270).

(2.) Extending and converting for electric lighting, existing cast-iron gas-lamp columns stored by the Council with erection. (Approximately number 100.)

(b) Provision and erection of reinforced concrete columns complete with lanterns and control gear. (Approximately number 70.)

Specification, bill of quantities and form of tender may be obtained from the Borough Engineer and Surveyor upon receipt of £2 deposit which will be returned upon receipt of a bona-fide tender.

Sealed tenders in envelopes supplied by the Council, endorsed "Tender for Group B Lighting," and in no way marked to indicate the sender, to be delivered by post to the undersigned by noon on June 23, 1952.

The Council do not bind themselves to accept the lowest or any tender.

A. McCARLIE FINDLAY,
Town Clerk.

Municipal Offices,
High Road, Woodford, E.18.
May, 1952. (S 340)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

THE BRITISH IRON AND STEEL RESEARCH ASSOCIATION

ELECTRICAL ENGINEERS required by the Plant Engineering Division of the above Association to carry out applied research in the iron and steel industry. Honours degree in electrical engineering essential. Experience in either heavy electrical engineering control problems and servo-mechanisms, or in electronics very desirable. Age range 26-34. Salary according to age, qualification and experience. Post is superannuated under the F.S.S.U. Location of work London.

Written applications only to Personnel Officer, B.I.S.R.A. 11 Park Lane, London, W.1. (S 302)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Applicants should have had sound technical and/or mechanical training. Salaries and conditions of service in accordance with N.J.B. Schedule including London Allowance.

SHIFT CHARGE ENGINEER

Hammersmith Generating Station

Qualifications, practical experience in the running and efficient operation of power station plant. Character and ability to deal with staff problems is important. Salary, Schedule A, Class "D," Grade 7, £643 13s. p.a.

ASSISTANT SHIFT CHARGE ENGINEER

West Ham Generating Station

Candidates expected to carry out the duties in the control room and boiler house, according to requirements, and will be directly responsible to the Shift Charge Engineer. Salary, Schedule A, Class "H," Grade 9, £693 p.a.

JUNIOR ENGINEER

West Ham Generating Station

Qualifications, sound training up to approximately Higher National Certificate standard with practical experience of power station plant. General duties in station. Salary, Schedule A, Class "H," Grade 14, £504 p.a.

ENGINEER DRAUGHTSMAN

West Ham Generating Station

Candidates required to undertake general drawing office duties. Salary, Schedule D, within (Grade 6, £438 to £574 7s. p.a.

ASSISTANT MECHANICAL REPAIRS ENGINEER (BOILER HOUSE)

Barking Generating Station

Qualifications, considerable experience in repairs and maintenance of all types of boiler house equipment, and be accustomed to handling men. Salary, Schedule A, Class "M," Grade 10, £822 3s. p.a.

ASSISTANT BOILER HOUSE SUPERINTENDENT

Battersea Generating Station

Qualifications, sound engineering training, with technical qualifications to at least Higher National Certificate standard, followed by experience with large modern boiler plant, preferably including powdered fuel firing. Salary, Schedule A, Class "L," Grade 7, £946 1s. p.a.

STATION SHIFT CONTROL ENGINEER

Blackwall Point Generating Station

Qualifications, practical experience in control and operation of generating plant and e.h.t. switchgear. Salary, Schedule A, Class "F," Grade 10, £584 17s. p.a.

ASSISTANT SHIFT CHARGE ENGINEER

Deptford East Generating Station

Qualifications, sound engineering training with technical qualifications of Higher National Certificate standard, together with experience in operation of large modern power station plant. Duties, assisting the Shift Charge Engineer in all departments. Salary, Schedule A, Class "H," Grade 9, £693 p.a.

JUNIOR ENGINEER

Deptford East Generating Station

Qualifications, sound engineering training with technical qualifications of at least Ordinary National Certificate standard followed by some experience with operation and/or maintenance of power station plant. Salary, Schedule A, Class "H," Grade 14, £504 p.a.

MAINTENANCE ENGINEER (MECHANICAL)

Brunswick Wharf Generating Station

Qualifications, wide experience in maintenance of modern generating plant necessary. Duties will include organisation and planning of overhauls of turbines and boiler plant, keeping records relating to plant history and programming the obtaining of stores to cover such overhaul periods. Salary, Schedule A, Class "H," Grade 7, £784 7s. p.a.

JUNIOR ENGINEER

Testing and Efficiency Department, Divisional H.Q.

Candidates should have a good technical education. Duties will include preparation of operating statistical returns and knowledge of station statistics is desirable. Salary, Schedule C, Class "AX/EX," Grade 9, £400 to £597 9s. p.a.

1st ASSISTANT CONTROL ENGINEER

Paternoster Grid Control Centre, London

Salary in accordance with N.J.B. Schedule C, Class "AX/EX," Grade 5, £660 9s. to £900 18s. p.a.

GENERAL ASSISTANT ENGINEERS

Paternoster Grid Control Centre, London

Salary in accordance with N.J.B. Schedule C, Class "AX/EX," Grade 8, £506 to £728 14s. p.a.

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Technical qualifications to Grad.I.E.E. standard are required and previous power station experience is desirable.

CHEMISTS

Candidates required to carry out investigational work in collaboration with other scientists and under direction, on problems arising in chemical engineering, metallurgy and combustion. Two appointments will be made to fill vacancies at Barking and Fulham laboratories. Candidates should preferably be graduate, or possess minimum qualification of Higher National Certificate. Commencing salary according to age, qualifications and experience, minimum £506 p.a.

Vacancies also exist for JUNIORS, of either sex, who are interested in a scientific career. Possession of a reasonable standard General Certificate of Education essential. Consideration and encouragement given to those wishing to continue their studies by part-time facilities. Commencing salary according to age and qualification. Applications are invited from boys or girls who can work in the East London, Greenwich, Barking or Hackney districts.

Applications for all the foregoing to Divisional Secretary, B.E.A. London Division, Ergon House, Horseferry Road, S.W.1, stating qualification, experience and age, within 14 days of the appearance of this advertisement.

H. V. PUGH,
Divisional Controller.
(S 375)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the under-mentioned superannuable appointments in the Generation (Construction) Department at this headquarters at salaries in accordance with the N.J.B. Agreement.

Vacancy No. 37/52. SECOND ASSISTANT ENGINEER (ELECTRICAL). "AX/CX," Grade 2, £809 to £1,000 p.a.

Vacancy No. 38/52. SENIOR DRAUGHTSMAN (MECHANICAL), Schedule D, Grade 5, £547 to £651 p.a.

For Vacancy 37/52 applicants must be corporate members of the Institution of Electrical Engineers; had experience in power station construction; be able to make investigations and prepare schemes and specifications for new projects.

For Vacancy 38/52 applicants should preferably have obtained the Higher National Certificate and a knowledge of power station installations and layout will be considered an advantage.

Application forms obtainable from the Divisional Secretary at the address below, should be returned by June 3, 1952.

H. J. BENNETT,
Divisional Controller.

British Electricity Authority,
Cardiff (Pengam Moors) Airport,
Cardiff.
May 13, 1952. (S 359)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS invited for the following:

JUNIOR ENGINEER

Basingstoke District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class "D", Grade 15 (£375 per annum). N.J.B. conditions of service.

Applicants should have experience in the design, construction, operation and maintenance of h.v. and l.v. overhead and underground distribution systems, substation plant and distribution equipment, and possess suitable technical qualifications. The appointment will involve standby duties.

The successful candidate will be required to contribute to the B.E.A. and Area Boards' superannuation scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes endorsed "Junior Engineer," not later than Monday, June 2, 1952.

F. W. KEMPTON,
Secretary.
May 22, 1952. (S 376)

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

STAFF VACANCY NOTICE

APPLICATIONS are invited for the position of MAINTENANCE ENGINEER (MECHANICAL) at Braehead Power Station.

Experience in high pressure boilers, including pulverised fuel and turbines is essential. The salary will be in accordance with Grade 6, Class "H" of Schedule A of the National Joint Board Agreement.

Applications, stating age, technical attainments and experience should be forwarded on Form A.E.6 to the Divisional Secretary, British Electricity House, 168 Broomhill Drive, Glasgow, W.1.

The closing date for applications is June 6, 1952.
(S 374)

NORTH WESTERN ELECTRICITY BOARD

PRINCIPAL ASSISTANT

Commercial Development Section, Headquarters, Manchester

APPLICANTS should have experience of the various means which can be used for presentation of service to the consumer. Knowledge of tariffs, hire and hire-purchase practice and domestic electrical appliances essential. Duties will include the operation of commercial information services and the compilation of sales staff handbooks for technical and non-technical staff. Applicants should be able correspondents and good organisers.

Salary scale: £950 to £1,070 p.a. N.J.C. conditions.

Applications, stating age, technical or other qualifications, training and experience, present post and salary, should be received by the Establishment Officer, The North Western Electricity Board, Cheetwood Road, Manchester 8, by May 31, 1952.

No. 2 Sub-Area

JUNIOR ENGINEERS

Sub-Area Technical Engineer's Department, Manchester.

Applicants should have had good practical experience in the testing of protective gear, large power metering, and general testing. Preference given to candidates who possess H.N.C. in electrical engineering or who are members of the I.E.E.

Salary range: £375 to £527 p.a. Class "L", Grades 20-16. N.J.B. conditions.

Applications to Sub-Area Manager, No. 2 Sub-Area, The North Western Electricity Board, National Buildings, St. Mary's Parsonage, Manchester 3, by May 31, 1952. (S 355)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following superannuable position. Salary and conditions of service will be in accordance with the National Joint Board Agreement:—

BOILER HOUSE SHIFT CHARGE ENGINEER

Cliff Quay Generating Station

Applicants should have served an apprenticeship and preferably possess a Higher National Certificate in Mechanical Engineering or equivalent.

Preference will be given to applicants with experience in the operation of large pulverised fuel-fired high-pressure boilers and associated equipment in generating stations.

Salary N.J.B., Class "J/9," £699-£728 per annum.

Applications, stating age, qualifications and experience, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, by May 31, 1952.

W. N. C. CLINCH,
Controller.
(S 358)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Edinburgh Sub-Area

Dewar Place, Edinburgh 3

APPLICATIONS are invited for the position of THIRD ASSISTANT ENGINEER in the meter-testing station of the Edinburgh Sub-Area. Salary in accordance with the N.J.B. revised agreement, Schedule A, Class "H," Grade 10, Column 1. The appointment is superannuable.

Candidates should have obtained the Higher National Certificate in electrical engineering or an equivalent qualification and have had experience in the testing and repair of meters (including polyphase meters) and instruments.

Applications, giving age, qualifications, experience, present position and salary, should be addressed to the undersigned within 14 days.

G. T. ALLCOCK,
Sub-Area Manager.
(S 341)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for DEPUTY STATION SUPERINTENDENT at Earley Generating Station, Reading. Applicants should preferably be Corporate Members of a recognised professional Institution, and have had a wide experience in the operation, maintenance and administration of a large modern generating station. Housing accommodation available.

Salary, N.J.B. Class "C.3," £946 to £989.

Application forms, which are obtainable from P. D. A. Oliver, Divisional Secretary, British Electricity House, 111 High Street, Portsmouth, must be returned by June 6, 1952. (S 382)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following posts in the Construction Department of the Division:

2ND ASSISTANT ENGINEERS
(Civil) (Vacancy No. 44)

Applicants should hold a degree in Civil Engineering, be Corporate Members of the Institution of Civil Engineers or possess equivalent qualifications.

They should have had experience in the design and construction of heavy foundations, river works, structures in reinforced concrete and steel, and other civil engineering works associated with the design and construction of power stations.

Experience in the preparation of specifications, bills of quantities and estimates will be an advantage.

Salary will be within Schedule C, Class "AX/DX," Grade 2 (£809 to £1,028 per annum) of the National Joint Board Agreement.

SECOND ASSISTANT ENGINEERS
(Mechanical) (Vacancy No. 45)

Applicants should hold a degree in Mechanical Engineering, be Corporate Members of the Institution of Mechanical Engineers, or possess equivalent qualifications.

They should be experienced in the design and construction of turbo-alternators, boilers, coal and ash handling plant, high pressure steam and water piping and other ancillary work.

Experience in the preparation of specifications and estimates and a knowledge of thermo-dynamics and hydraulics will be an advantage.

Salary will be within Schedule C, Class "AX/DX," Grade 2 (£809 to £1,028 per annum) of the National Joint Board Agreement.

SECOND ASSISTANT ENGINEERS
(Electrical) (Vacancy No. 46)

Applicants should hold a degree in electrical engineering, be Corporate Members of the Institution of Electrical Engineers, or possess other equivalent qualifications.

They should have had experience in the design and installation of turbo-alternators, switchgear, transformers, and cables up to 33 kV and other electrical equipment associated with modern power stations.

Experience in the preparation of specifications and estimates will be an advantage.

Salary will be within Schedule C, Class "AX/DX," Grade 2 (£809 to £1,028 per annum) of the National Joint Board Agreement.

CIVIL ENGINEERING DRAUGHTSMEN
(Vacancy No. 47)

Candidates should preferably have had experience in:

(a) Design and detail of steel frame buildings, bridge and gantries, etc., or
(b) Design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., or
(c) General buildings construction, drainage and sanitation schemes, associated with offices and administrative buildings.

MECHANICAL ENGINEERING DRAUGHTSMEN
(Vacancy No. 48)

Candidates should have had experience in the layout of boilers and turbines and auxiliary equipment. Condensing plant, coal and ash handling plant, h.p. and l.p. pipework installations.

ELECTRICAL DRAUGHTSMEN
(Vacancy No. 49)

Candidates should have had experience in the layout and installation of e.h.t. and l.t. switchgear, transformers, e.h.t. and l.t. cabling.

The salary for vacancies Nos. 47, 48 and 49 will be within Grade 5 (£547 to £651 p.a.) or Grade 6 (£413 to £547 p.a.) according to experience and qualifications.

The posts will be pensionable within the provisions of the Authority's Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, stating vacancy number, and should be returned not later than June 14, 1952.

L. F. JEFFREY,
Divisional Controller.
May 15, 1952. (S 373)

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY No. 725. STATION SUPERINTENDENT, Burnley Generating Station. Salary £917 to £936 p.a. (N.J.B. C.1)

VACANCY No. 726. ASSISTANT SHIFT CHARGE ENGINEERS (5), Huncoat Generating Station, Accrington. Salary £587 to £609 p.a. (N.J.B. F.9).

VACANCY No. 727. JUNIOR ENGINEERS, Westwood Generating Station, Wigan. Commencing salary £375 p.a. rising to £471 (N.J.B. G16/14). Shift duties.

Apply, quoting Vacancy No. to Establishment Officer, British Electricity House, 825, Wilmslow Road, Manchester 20, before May 31. (S 357)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

No. 5 (Wakefield) Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER
Barnsley District (Vacancy No. 66/52).

Applicants must have had a sound practical training and considerable experience in the construction, operation and maintenance of h.v. and l.v. overhead and underground distribution networks, substation plant and ancillary equipment.

Preference will be given to applicants who are Corporate Members of the Institution of Electrical Engineers or who hold equivalent qualifications.

Salary, Class "F," Grade 7, £877/£696 per annum.

GENERAL ASSISTANT ENGINEER
(Construction) (Vacancy No. 68/52)

Applicants must have had a sound practical training and a year's experience in distribution work and have attained the Higher National Certificate standard.

Salary, Class "J," Grade 13, £532/553 per annum.

Applications, stating the vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, not later than June 5, 1952.

No. 3 (Sheffield) Sub-Area

HOUSECRAFT ADVISER
(Female) (Vacancy No. 74/52)

Applicants must be qualified demonstrators holding recognised diplomas in domestic science (preferably including Institution management), and possess the E.A.W. Certificate. They must have had considerable experience in the organisation of a demonstration and lecture service, in control of staff, and be capable of establishing relations with Education Authorities, Institutions, Industrial and Commercial Catering Establishments and advising them on the use of electrical equipment.

Salary, N.J.C. Grade 3, £500/£20/£560 per annum.

Applications, stating the vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, not later than June 5, 1952. (S 351)

SOUTHERN RHODESIA GOVERNMENT

VACANCY: ASSISTANT ELECTRICAL ENGINEER
Public Works Department

APPLICATIONS are invited for the above-mentioned post. The successful applicant will be appointed on a three-year contract.

The minimum qualification for the post is the Associate Membership of the Institution of Electrical Engineers, London. Applicants must have not less than four years secondary education and not less than ten years practical experience in connection with the design of electrical and allied installations in large institutions, particularly hospitals. Experience of air-conditioning and refrigeration problems would be an advantage.

Salary: 1st year, £1,180 per annum; 2nd year, £1,220 per annum; 3rd year, £1,260 per annum.

In addition to salary a Cost of Living allowance of approximately 24 per cent. of salary is payable and where applicable, children's allowances.

Application forms and general information may be obtained from the Secretary, Rhodesia House, 429 Strand, London, W.C.2., to whom completed applications should be sent before June 16, 1952. (S 347)

BRITISH ELECTRICITY AUTHORITY

South East Scotland Division

DEPUTY POWER STATION SUPERINTENDENT required for Bonnybridge power station, Stirlingshire.

Applicants must have had good technical education and experience in operation and maintenance of modern steam generating plant. Knowledge of high-tension switchgear essential.

Salary £887-£925 (N.J.B., Class "F/3"). Pension scheme.

Apply, by May 31, 1952, stating age and experience, to Divisional Controller, British Electricity House, Portobello, Midlothian. (S 342)

BRITISH ELECTRICITY AUTHORITY

North Western Division

MAINTENANCE ENGINEER (MECHANICAL) required at Stuart Street Generating Station, Manchester. Salary £747 to £778 (N.J.B. H.7). Sound technical training and experience of generating station mechanical maintenance essential, also ability to organise and progress maintenance programmes.—Apply: quoting Vacancy No. 728 to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before May 31. (S 356)

BRITISH ELECTRICITY AUTHORITY

South Western Division

JUNIOR ENGINEER required at Castle Meads generating station.

Superannuation scheme. Salary N.J.B., commencing Class "E", Grade 15, £375, 12 months after appointment Grade 14, £413-£426.

Applicants required to carry out general technical duties, experience in statistical and instrument work considered an advantage.

Apply, by May 31, 1952, stating age, qualifications, experience, present appointment and salary, to R. C. Barrett, Divisional Secretary, 26 Oakfield Road, Bristol 8. May 13, 1952. (S 343)

A GOOD OPPORTUNITY in the electrical industry is open to an energetic and keen REPRESENTATIVE who has established contacts with buyers, and preferably a knowledge of low tension electric porcelains, cooker and fire refractories and low loss radio ceramics.—Please apply in first instance giving full details to Box No. 1733, Electrical Times. (S 361)

ASSISTANT ELECTRICAL ENGINEER required for a fully integrated iron and steel works in the north west. Applicants should have sound technical qualifications, together with considerable experience of heavy plant installation and maintenance. Salary in accordance with age and experience.—Applications, stating age, qualifications and list of appointments held in chronological order, to Box No. 1741, Electrical Times. (S 379)

BRITISH ELECTRICITY AUTHORITY require DRAUGHTSMEN for the Chief Engineer's department in London with experience in either (a) reinforced concrete design and detail, or (b) lay-out of outdoor substation and electrical diagrams, or (c) lay-out of power stations or ancillary equipment.

Salary according to age and experience within N.J.B. Grade 6, £438-£574. Pension scheme.

Forms from D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, London, W.1. Quote reference AE.254. (S 364)

BRITISH ELECTRICITY AUTHORITY require a JUNIOR ENGINEER at the Croydon Testing Station of the Chief Engineer's department. Candidates should have a Higher National Certificate in electrical or mechanical engineering or equivalent qualification. Duties include research on water cooling towers and power station plant. Salary N.J.B. Grade 6, £400-£615, including London allowance.—Applications to D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, London, W.1. not later than June 9, 1952. Quote ref. AE.258. (S 366)

BRITISH ELECTRICITY AUTHORITY (East Midlands Division) require two GENERATION ENGINEERS (CONSTRUCTION) based at Divisional Headquarters, Nottingham.

Candidates should have first-hand experience of the work involved in the design, layout and construction of new power stations and extensions to existing stations, and preferably have had practical works training. They should have good organising ability, and possess the highest technical qualifications in mechanical, electrical or civil engineering, and should be Corporate Members of one of the professional Engineering Institutions.

The successful candidates will be responsible to the Chief Generation Engineer (Construction) for work on the development of new power stations, including their design and layout, as well as extensions to existing stations.

Salary within provisional range £1,250 to £1,750. Pension scheme.

Applications, stating age, qualifications, experience, present position and salary, to D. Moffat, Director of Establishments, British Electricity House, 170 Great Portland Street, W.1, by June 7, 1952. Quote reference No. AE.255. (S 362)

BRITISH ELECTRICITY AUTHORITY require a SENIOR DRAUGHTSMAN (minimum age 26) in the Drawing Office at Headquarters. Candidates must be experienced in reinforced concrete design and detail. Salary N.J.B., Grade 5, £574-£684 including London Allowance.—Forms from D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, London, W.1, to be returned by June 9, 1952. Quote ref. AE.257. (S 363)

CHIEF DESIGNER/DRAUGHTSMAN required by company manufacturing full range of fractional h.p. motors.—Write, stating age, experience and salary required, to Carter Electrical Co., Ltd., Eastern Works, Eastern Avenue, Romford, Essex. (S 367)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

CONSULTING ENGINEERS' office has vacancies for young ENGINEERING ASSISTANTS who have graduated and served a recognised apprenticeship course in heavy power-plant engineering. Vacancies exist both for those who have just completed their apprenticeship and for those who have had further experience. Promising applicants who had received only a limited amount of works training may also be accepted and given further training within the organisation. Versatility and ability to think clearly are important for the work, which comprises a variety of engineering, scientific and economic investigations. Good commencing salary and prospects. Excellent working conditions. — Particulars, preferably typed, with covering letter in applicant's handwriting, to Merz and McLellan, "Milburn," Esher, Surrey. (S 295)

DESIGN ASSISTANT for a.c. and d.c. machines. Experience desirable, but not essential. Progressive position.—Higgs Motors, Witton, Birmingham. (S 334)

DRAUGHTSMEN required for cable-laying contract work, liberal subsistence allowance when working away.—Apply by letter in first instance to Contracts Department, Pirelli General Cable Works, Ltd., Leigh Road, Eastleigh, Hants. (S 378)

ELECTRICAL Repair and Rewinding Service requires knowledgeable REPRESENTATIVE for East London. —Box No. 1707, Electrical Times. (S 238)

ELECTRICAL ENGINEER required with works and drawing office experience. To calculate quantities and allowances of raw materials and compile schedules for ordering. To assist also with technical and sales correspondence in connection with relays and small electrical equipment.—Apply in writing, giving details of age, education, technical training, experience and salary required, to the General Manager, Hendrey Relays Ltd., Bath Road, Slough, Bucks. (S 384)

JUNIOR ELECTRICAL ENGINEER aged 22-30 required for Research and Development work in connection with electrical accessories, low tension switch and fusegear, etc. Must be capable of working on own initiative and running a small laboratory. London area. Applicants should have good educational qualifications, Higher National Certificate, Int.B.Sc. or Grad. I.E.E., and should preferably have served a recognised apprenticeship. Excellent prospects and a good salary is offered.—Write with full particulars to Box No. 1729, Electrical Times. (S 349)

JUNIOR METER TESTER required by English Electric Co., Ltd., Stafford, experience in single-phase meter test essential, polyphase meter experience an advantage. Progressive post for young man anxious to improve. Permanent position, good working conditions, canteen and dental facilities, non-contributory life insurance and pensions schemes, eligibility according to rules. Hostel accommodation available.—Apply, quoting Stafford Ministry of Labour Order No. 473, stating age and experience to Ministry of Labour and National Service Office, Stafford. (S 305)

LAMP and lighting SALES ENGINEER required by important manufacturer (E.L.M.A.) for the Manchester area. Must have suitable qualifications, and be able to deal with large buyers.—Apply Box No. 1715, Electrical Times. (S 244)

LEADING AND SENIOR DRAUGHTSMEN required for transformer work of the largest class.—Apply by letter, quoting "Transformer" and giving full details of age, experience and salary required to Staff Manager, General Electric Co., Ltd., Witton, Birmingham, 6, through your nearest Employment Exchange. (S 304)

MAINTENANCE ELECTRICIAN'S ASSISTANT required. Theoretical and practical knowledge and experience in factory maintenance of lifts, hoists, motors, fluorescent lighting and heating. Willing to learn electronic work. 5-day week, canteen, sports club.—Please write, stating age and experience to Employment Officer, Godfrey Phillips, Ltd., 112 Commercial Street, E.1. (S 377)

MOTOR BULBS, West London. First-class FOREMAN, Headlamp section. Specially experienced in 4-wire stem making. Salary up to £11 per week plus bonus Also ENGINEER DESIGNER for production Lamp making Machinery, age 25/30. One 3-bedroom house available for right person.—Box No. 1711, Electrical Times. (S 242)

PURCHASING CLERK with electrical and radio experience required for Bayswater firm. State experience and salary required.—Box No. B.R., c/o Brockie Haslam and Co., 231 Strand, London W.C.2. (S 383)

POWER STATION SHIFT CONTROL ENGINEERS required at the Margam works of The Steel Company of Wales Limited. Applicants must produce evidence of advanced technical education, and have experience in the control of an inter-connected H.T. network. Some experience in H.P. industrial boiler and turbine operation would be an advantage.

Salary, which is pensionable, according to age and experience. Applications should be in own handwriting addressed: The Personnel Superintendent, The Steel Company of Wales Ltd., Box No. 3, Port Talbot. (S 348)

PRACTICAL ENGINEER, with qualifications to about university degree standard, and with good all-round mechanical and electrical experience, is required for the design of small components used in the field of electronic research. This is an attractive opening for work at Stanmore.—Apply to the Staff Manager (Ref. GBLC/S.23), Research Laboratories of the General Electric Co., Ltd., Wembley, Middlesex, stating age and record. (S 335)

SUDAN LIGHT AND POWER CO., LTD., KHARTOUM. APPOINTMENT OF ASSISTANT ELECTRICAL ENGINEER. Applications are invited to fill the above appointment. Candidates should preferably be under 45 years of age and have at least five years' experience with the mains department of a progressive electricity supply undertaking.

Responsibilities attached to the appointment include the carrying out of an extensive development programme and the operation of the supply undertaking in Khartoum and district during the electrical engineer's absence on leave, together with electrical problems attached to the water and transport undertakings operated by the company.

Salary from £E.950 to £E.1,390 according to age and experience.

Additional benefits: Cost-of living allowance varying with published C.O.L. Indices at present approximately £E.135 per annum. Free quarters including certain furniture and furnishings. Electricity and water supplies. Mechanical transport. Liberal leave (annually after first 12 months) with free passages. Pension scheme. Kit allowance £E.50. There is no income tax in the Sudan at present.

The £Egyptian is at present date equivalent to £1 0s. 6d. sterling.

Applications should be addressed immediately to Box No. 1735, Electrical Times. (S 365)

SWITCHGEAR DESIGN DRAUGHTSMAN required. Applicants should have experience in the design of oil-immersed metalclad equipment for 250 MVA at 11 kV, and possess good technical knowledge of this type of gear.—Apply, in own handwriting, giving details of age, qualifications and experience, to Box No. 1725, Electrical Times. (S 307)

TECHNICAL ASSISTANT required for development work in connection with the design and manufacture of paper-insulated cables up to the highest voltages. University degree or H.N.C. standard desirable. The situation is a progressive one with good prospects and the salary paid will be in accordance with the attainments and ability of the applicant. Age 22 to 35 years.—Apply, giving full details of experience, etc., to the Secretary, W. T. Glover and Co. Ltd., Trafford Park, Manchester 17. (S 344)

THE ENGLISH ELECTRIC CO., LTD. require a SALESMAN, experienced in domestic electrical appliances, for work in the north of England. Candidates should have established connections with the electrical trade, be living in the north and hold clean, current driving licence.—Please write, giving full details, to Westminster Employment Exchange, Chadwick Street, London, S.W.1, marking your application "English Electric 984". (S 360)

APPOINTMENTS WANTED

CONTRACTING ELECTRICIAN, 31, exp. estimating, desires position anywhere in Gt. Britain in supervisory capacity which requires initiative, drive and imagination.—Box No. 1745, Electrical Times. (S 385)

PUBLICITY MANAGER seeks post with industrial organisation. Industrial, electrical and advertising agency experience. Technical and prestige advertising, brochures, exhibitions, public relations, sales promotion. —Box No. 1697, Electrical Times. (S 221)

WANTED

A.C.—D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 20)

£50,000

Immediate cash available for purchase of New Ball and Roller Bearings, all types, Steel Balls and Rollers. Top prices paid, small quantities accepted.

CLAUDE RYE BEARINGS

895-921 Fulham Road, London, S.W.6
RENown 6174 (20 lines) (S 23p)

BALL, Roller and Taper Roller Bearings purchased. Good prices paid.—Offers to Berend and Berend Ltd., 62 Berners Street, London W.1. (R 333)

ONE PLATING GENERATOR having an output of 6 V, 6,000 amps. Price and delivery.—Oldfield Engineering Co , Ltd., 96, East Ordsall Lane, Salford 5. (S 370)

ONE SCREEN PROTECTED TYPE ALTERNATOR. Output any rating between 60-80 kW, 400 V, 3-phase, 50 c/s, 4 wires. Complete with exciter and control gear if available. Machine to be fitted with ball and roller type bearings and suitable for vertical mounting. Speed 750 to 1,000 r.p.m.—Oldfield Engineering Co., Ltd., 96, East Ordsall Lane, Salford 5. (S 369)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write, Elton Levy Co. Ltd., St. Ermin's (West Side), Caxton Street, London S.W.1. Tel.: WHItehall 9621/2/3. (A 3)

WANTED, WANTED, WANTED, HORIZONTAL DIESEL ENGINES, any size and condition.—Harry Murfet, Exporter, Daleside Road, Nottingham. (S 339)

WANTED. ROTARY CONVERTORS, any size.—Universal, 221 City Road, London E.C.1. (A 16)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED. MAWDSLEY GENERATORS, 65/85 V, 105 amps. 1,750/2,900 r.p.m., 6.75 kW.—C. G. and W. Young, 15 Colne Road, Twickenham. POP. 5168. (S 196)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED. D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 13)

WANTED. Westinghouse STATIC CONVERTOR. Type 4 kVA, 288 R15.—Box No. 1743, Electrical Times. (S 381)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 8631 (4 lines). —Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ASSEMBLY and WAVE WINDING. Capacity available all types.—Tel.: MOUntview 0057. (S 380)

CASTINGS. Fisher Foundries Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham. Victoria 0197. (P 570)

COMPONENTS. Press tools and pressings for the electrical trades. Good deliveries.—Rutterford Bros., Wivenhoe, Essex (Phone 477). (S 338)

MIDLAND CONCERN manufacturing small PRECISION PARTS for textile machinery can undertake additional work. Mixed labour force highly suitable for light assembly of small mechanisms.—Box No. 1737, Electrical Times. (S 368)

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COPPER WIRE FOR SALE AT ASSOCIATED PRICES

25 s.w.g. double enamelled	3,500 lb
26 s.w.g. " "	2,600 lb
33 s.w.g. " "	780 lb
43 s.w.g. " "	230 lb
44 s.w.g. " "	100 lb
16 s.w.g. double glass covered	520 lb
20 s.w.g. " " "	575 lb
23 s.w.g. " " "	1,000 lb

PORCHESTER ELECTRICAL SUPPLY CO. LTD.

15/16 GERRARD STREET, LONDON W.1
GERrard 7942-3. (S 300p)

CABLE 7.052 P.B.J., 100,000 yards for sale from stock.—S. G. Young, 154/6 Blackfriars Road, S.E.1. WATerloo 3131. (S 249)

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IMMERSION HEATERS. Grubb 4 kW, no purchase tax. All lengths 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed. Prompt delivery.—Write for latest lists and trade terms to Distributors, John Owner and Co. Ltd., Springfield Road, Birmingham 13. Tel.: Springfield 2339. (C 392)

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NEW BALL RACES, ROLLER, THRUST AND TIMKEN RACES in stock. Advise requirements.

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895-921 Fulham Road, London, S.W.6
RENown 6174 (20 lines) (S 21p)

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500 ½ in. screwed. Normal Bends, female, galvanised.
200 ½ in. screwed. Normal bends, male, galvanised.
550 Crabtree 15 amp, 3 pin, Flush Switch Plugs, complete with iron box and polished brass plate, double pole switch, complete with plug. Interlocking type. List No. 8661.
300 Scholes Extra Flush Pattern Fused Clock Connectors, in iron boxes. Screwed ½ in. Cat. No. CCEB.
Apply: Box No. 1739, Electrical Times. (S 371p)

LIGHTING EQUIPMENT

PURLEY CHOKES AND BALLASTS. Our 80 W Tapped h.p.f. Ballast, with Starter Switch-holder incorporated, is proving itself the most popular unit. Suitable for most fittings. 57/6 each, subject.—F. W. Blanshard Ltd. (Dept. ET), Purley, Surrey. Uplands 4818-9. (E 343)

METERS

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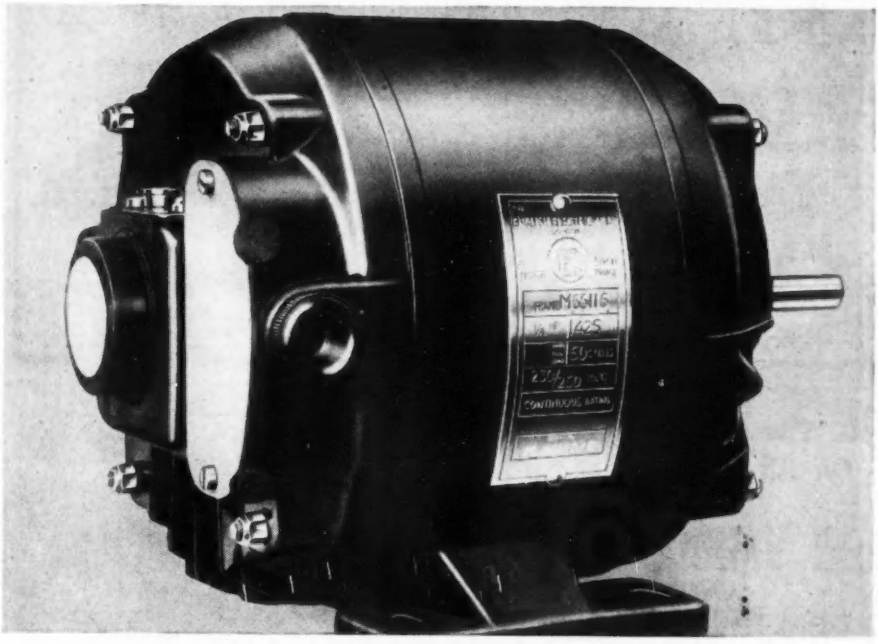

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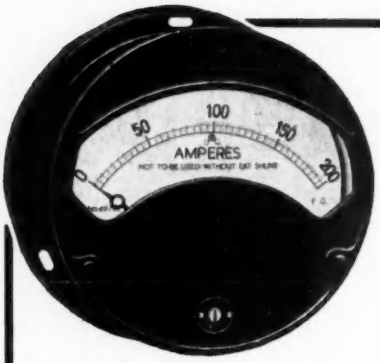

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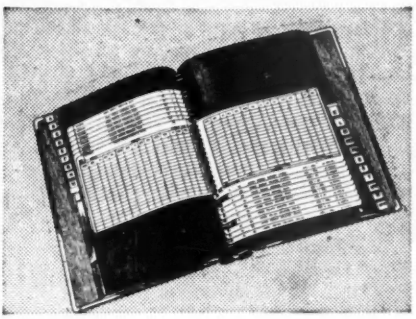

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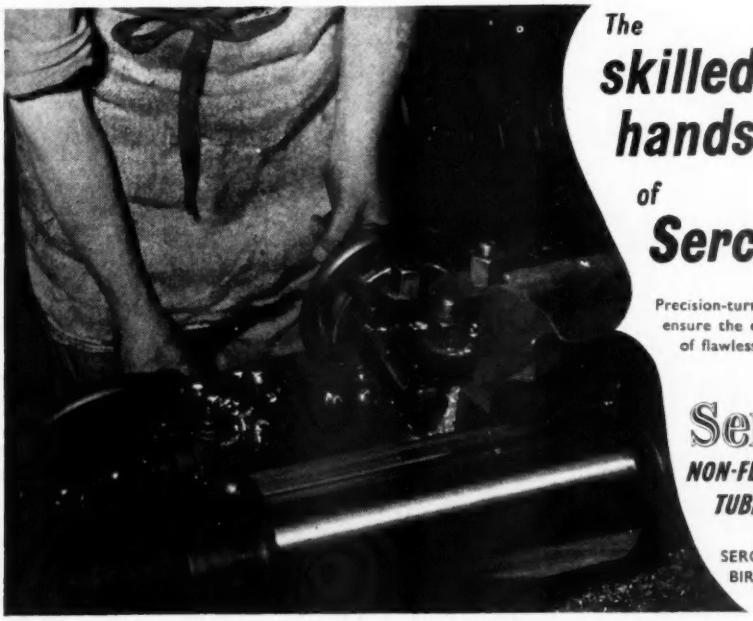

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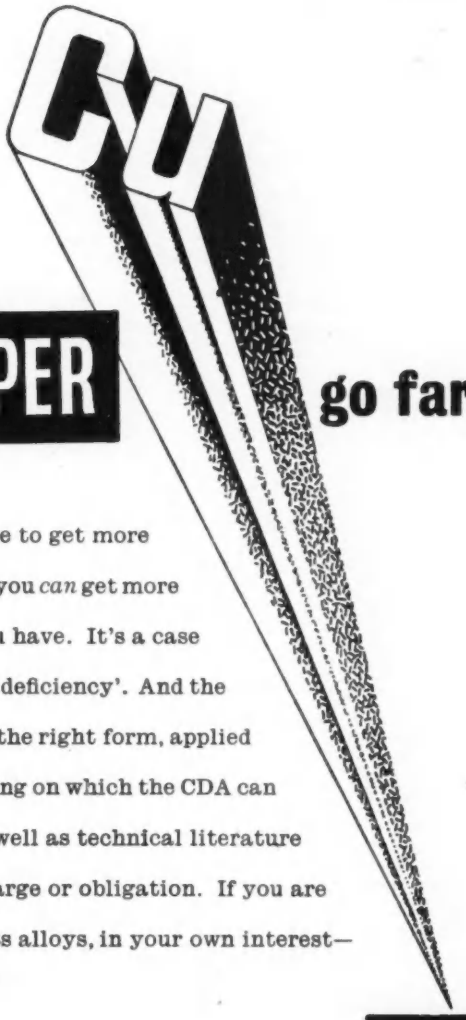

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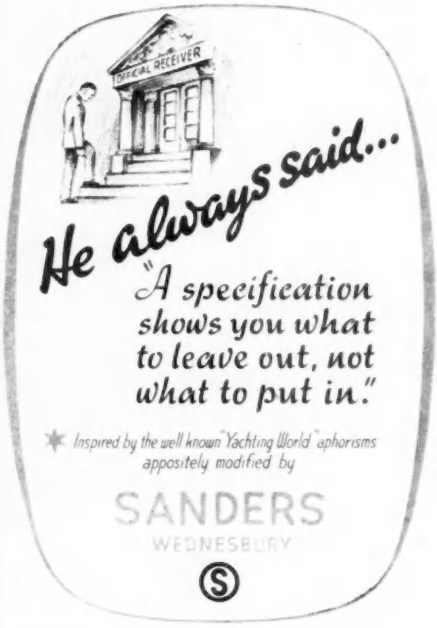
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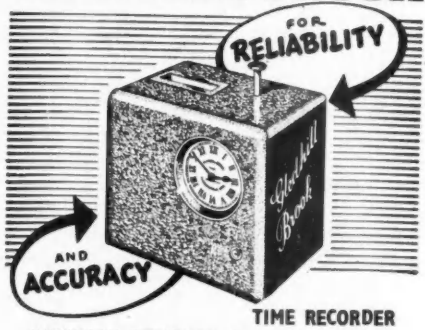

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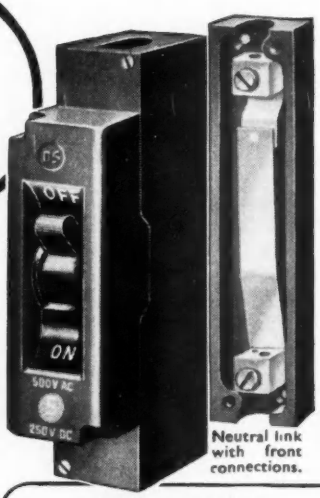

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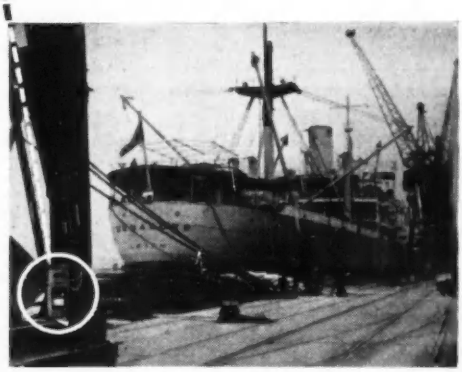

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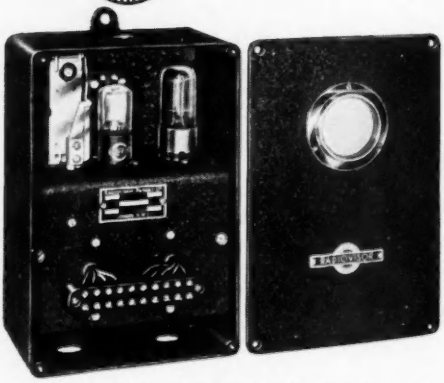

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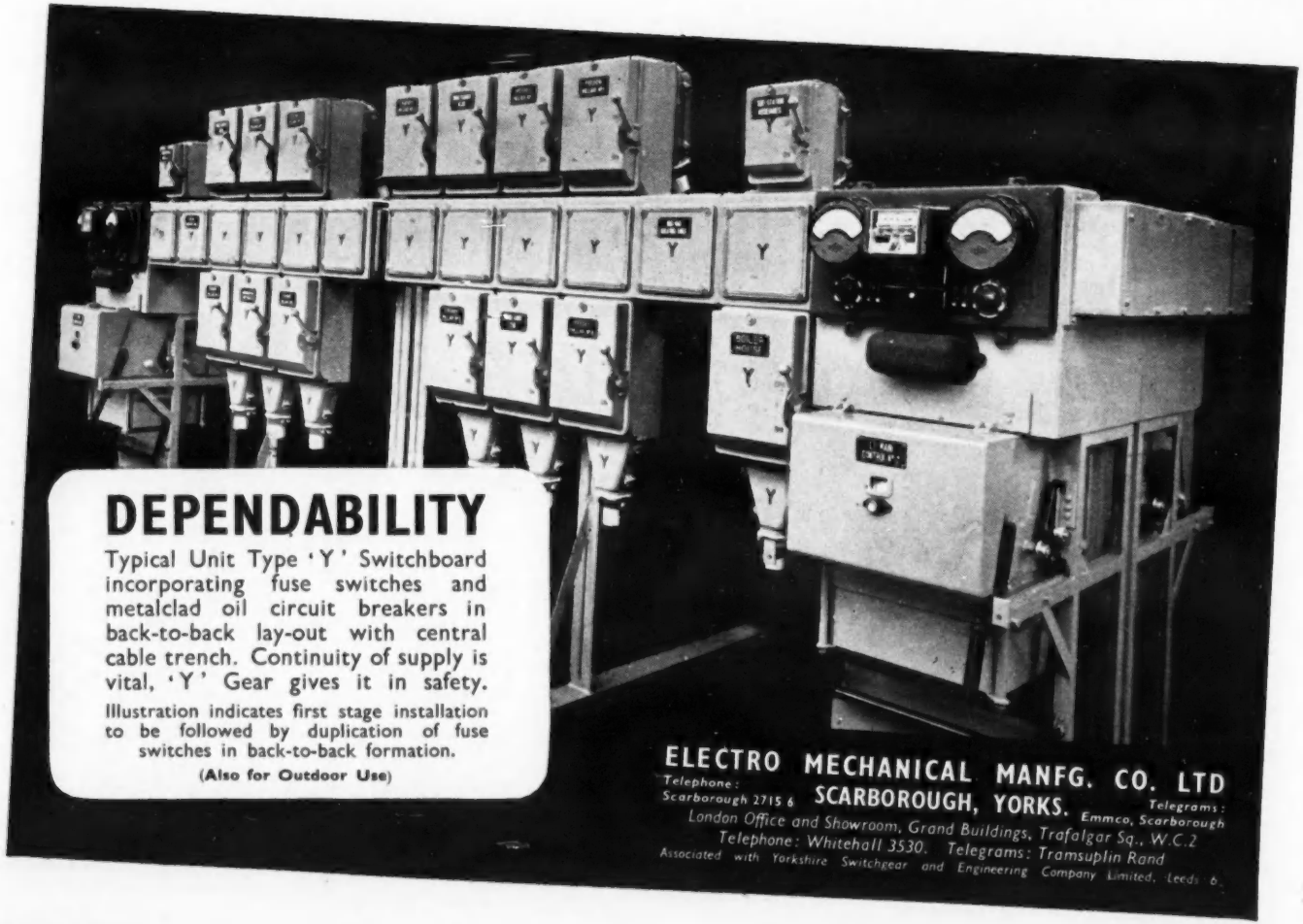

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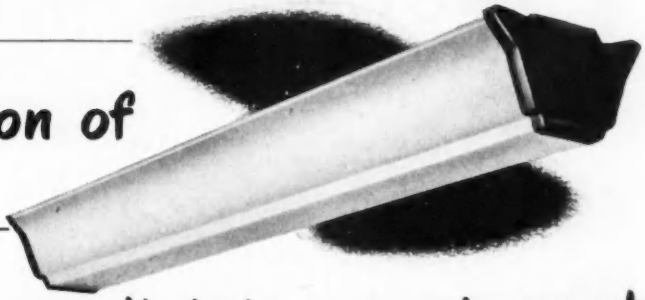

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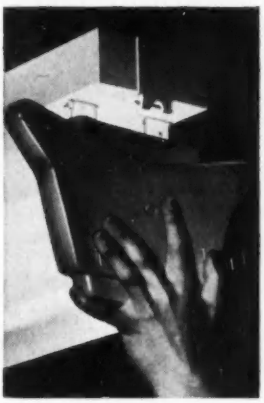

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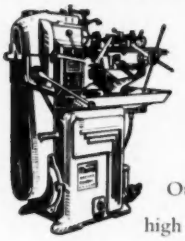

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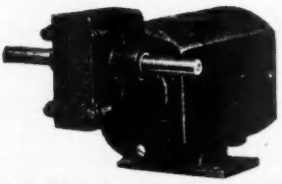

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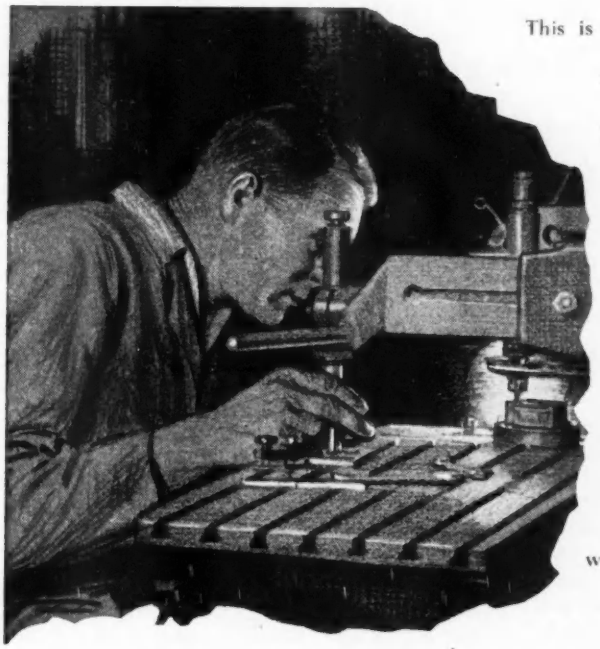

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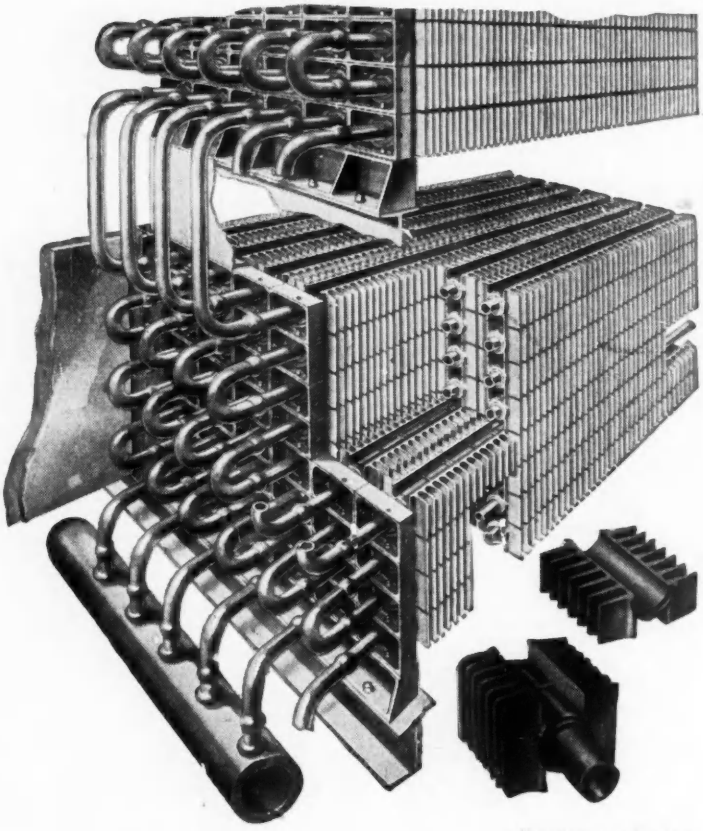

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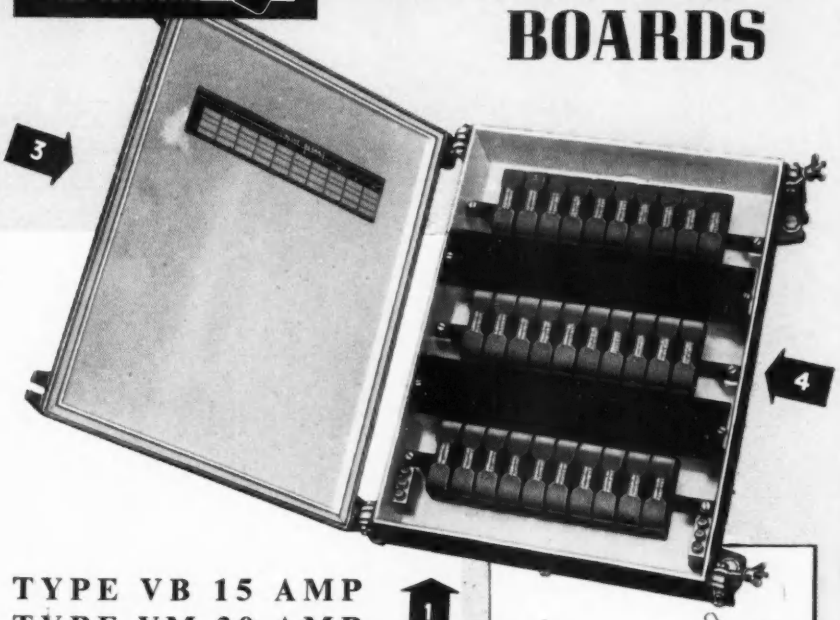

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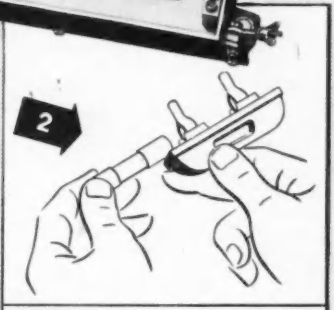

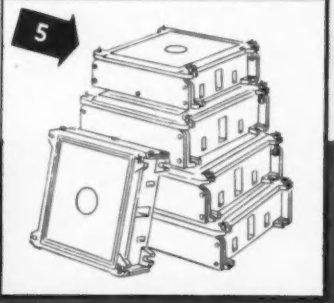

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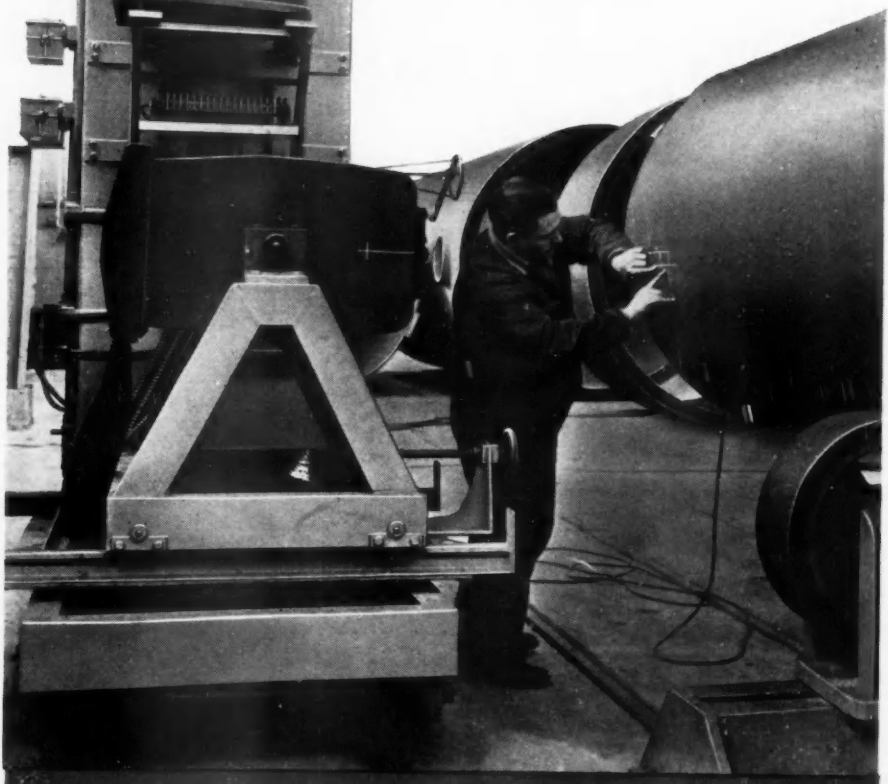

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